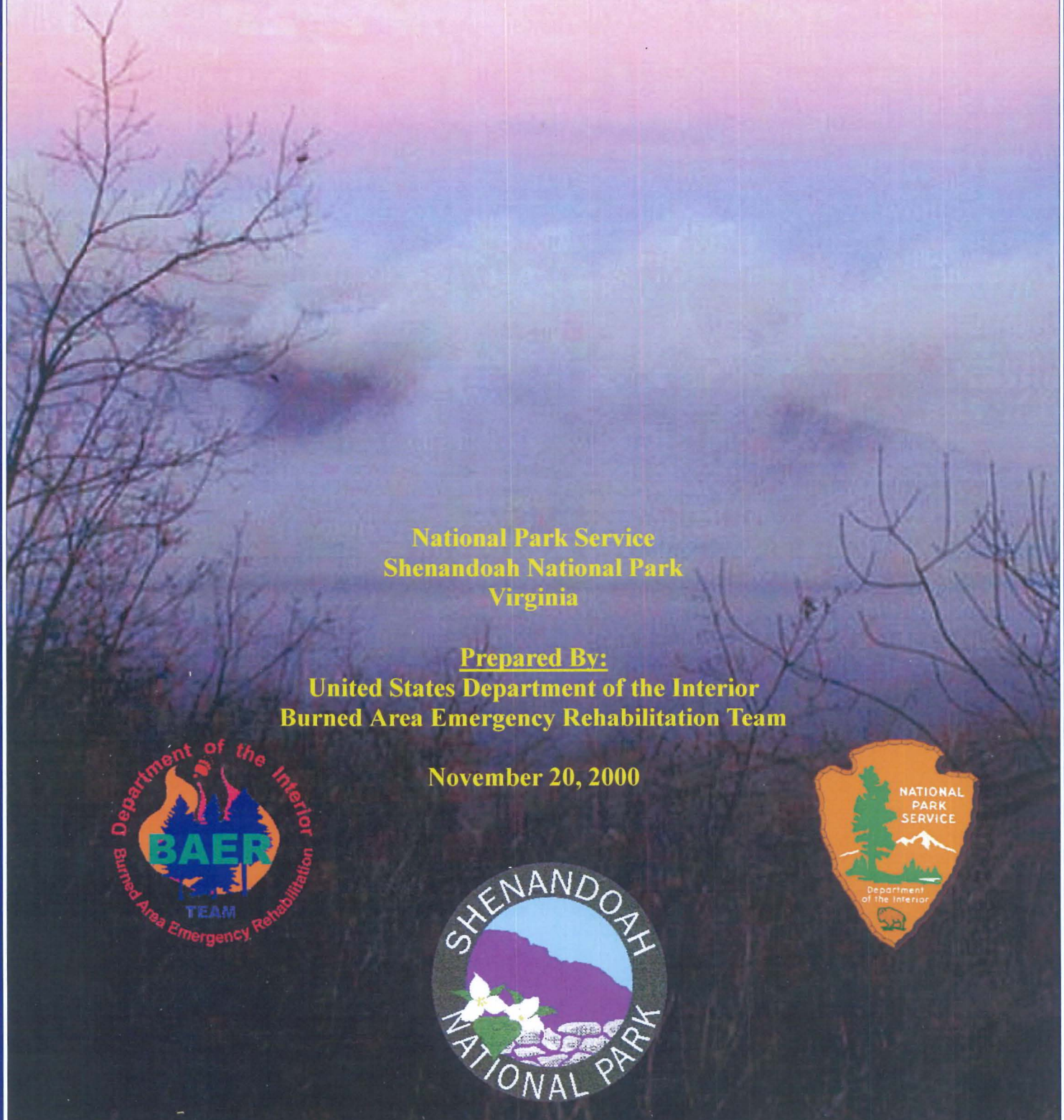
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Shenandoah Fire Complex

Burned Area Emergency Rehabilitation Plan



National Park Service
Shenandoah National Park
Virginia

Prepared By:
United States Department of the Interior
Burned Area Emergency Rehabilitation Team

November 20, 2000

Shenandoah Fire Complex
BURNED AREA EMERGENCY REHABILITATION (BAER) PLAN

AGENCY/UNIT: National Park Service
Shenandoah National Park

LOCATION: Luray, Virginia

DATE: November 20, 2000

PREPARED BY: U.S. Department of Interior
Burned Area Emergency Rehabilitation Team



Submitted By: Erv Gasser Date: Nov. 20, 2000
Erv Gasser, USDI, National Park Service

EXECUTIVE SUMMARY

This plan has been prepared in accordance with the *Interagency Policy Guidance and Direction; Wildland Fire Rehabilitation and Restoration (1998) signed by the Assistant Secretary of Interior, Policy, Management and Budget and Under Secretary of Agriculture, NRE.* This plan provides emergency fire rehabilitation recommendations for all lands burned within the Shenandoah Fire Complex including lands administered by the National Park Service (NPS) – Shenandoah National Park, and private land within the counties of Madison, Page, and Rappahannock, Virginia. The primary objectives of the Shenandoah Fire Complex Burned Area Emergency Rehabilitation (BAER) Plan are:

- To prescribe post-fire mitigation measures necessary to protect human life, property, and critical cultural and natural resources; and

- To promptly mitigate the unacceptable effects of the fire and suppression impacts on lands within and adjacent to the burned area in accordance with management policy guidelines and all relevant federal, state, and local laws and regulations.

This plan addresses emergency rehabilitation of fire suppression impacts and fire effects as a result of the Shenandoah Fire Complex that meet national policy guidelines for treatment under the Emergency Wildland Fire Rehabilitation and Restoration program.

The BAER Team has conducted an analysis of fire effects using aerial and ground reconnaissance methodologies throughout the lands impacted by the fire. The watershed group assessed and mapped the overall fire impacts on watershed conditions and developed a burn severity map for all jurisdictions. Archaeologists inventoried suppression impacts for potential damage to cultural sites as well as initiating a cultural resource damage assessment. The vegetation specialists evaluated and assessed fire effects and suppression impacts to vegetative resources including Threatened and Endangered (T&E) species, non-native invasive weed populations, forest resources and identified values at risk associated with vegetative losses. The wildlife biologist conducted an assessment of fire effects to T&E wildlife species and their associated habitat, suppression impacts to wildlife species, and addressed Section 7 consultation with the US Fish and Wildlife Service. The GIS specialists gathered the data layers necessary for the plan, coordinated GPS activities, processed data calculations for other resource specialists, and produced maps for the BAER Plan, presentations, and for implementing the treatments proposed in the BAER Plan. The park's Fire Management Office inventoried fire suppression impacts and facilities impacted by the fire, developed specifications for each, and implemented rehabilitation treatments on handlines, dozer lines, safety zones, and drop points within the fire area.

Resource assessments produced by these specialists can be found within Appendix I and treatments identified in the assessments can be located within Part F, Specifications. A summary of costs by jurisdiction is located in Part E. Part I is provided as a signature page for agency review and approval. Appendix II contains the National Environmental Policy Act (NEPA) compliance summary for all recommended treatments. Appendix III contains BAER Plan maps while Appendix IV contains photo documentation of fire effects. Supporting documentation can be found in Appendix V.

SHENANDOAH NATIONAL PARK MANAGEMENT

In May, 1926 an act (44Stat.616) was passed providing for the establishment of Shenandoah National Park. On July 3, 1936, President Franklin D. Roosevelt dedicated Shenandoah National Park "to the present and future generations of America for the recreation and re-creation which we shall find here." On October 2, 1968, Congress designated The Appalachian Trail, which runs the entire length of the park, as a National Scenic Trail. On October 20, 1976, an act was passed designating the Shenandoah Wilderness. Through these Acts and others, Shenandoah National Park has developed its goals to:

- Protect, maintain, and restore as appropriate the ecological integrity of this portion of the Blue Ridge/Central Appalachian biome.
- Protect, restore as appropriate, maintain in good condition, and manage in their cultural context, the significant cultural resources and associated values.

- Preserve in partnership with surrounding communities the scenic and rural character of the Shenandoah Valley and the Piedmont.

Several areas of the park have received special recognition due to their significance of natural or cultural resources. These designations exert significant influence on the management of these areas. Those particular to this fire include:

- Skyline Drive, Big Meadows, Pinnacles, and park headquarters are listed on the National Register of Historic Places. The significance is their relation with the Civilian Conservation Corps, the Works Progress Administration and several hundred architectural and landscape architectural structures and features.
- The Appalachian Trail is a designated National Scenic Trail and forms the backbone of the park's trail system. Of the 101 miles of Appalachian Trail within the park, 6.6 miles of trail are within the burn area.
- The Shenandoah Wilderness, consisting of 79,579 acres was designated in 1976. Of those acres, 14,829 acres are part of the Shenandoah Fire Complex.

The park is noteworthy for the changes in land uses since its establishment. Extensive evidence remains of a long history of human use (prehistoric and historic, mountain culture, resorts and recreational use). Today the park's large land mass represents a diverse and important ecosystem critical to maintaining the area's native flora and wildlife, water quality, and scenic values.

OTHER LANDS

Private lands within the fire perimeter are located in Madison, Page, and Rappahannock Counties. The private lands are primarily rural and residential adjacent to park boundaries. Some residences have lawns and woodlots, which abut the fire perimeter. The primary concern for private landowners is rehabilitation of suppression impacts and potential impacts from fire effects.

FIRE BACKGROUND

The Pinnacles Fire is suspected to have been started as an escaped campfire in the Pinnacles picnic area on October 29, 2000. On the same day, the Rapidan Road Fire started near Big Meadows. Its start is unknown. The next day the Old Rag Fire started, again of suspect origin. The fires are located approximately 10 miles east of Luray, Virginia, in Shenandoah National Park. Firefighting tactics drew the Pinnacles and Old Rag fires together, thereby removing their fuels. All fires were contained on November 12 and controlled on November 13. The fires burned from 840 to 3,730 feet elevation.

The Shenandoah Fire Complex consists of three fires: Pinnacles Fire – 18,066 acres; Rapidan Road Fire – 25 acres; and Old Rag Fire – 6,131, for a total acreage of 24,222. The acreage by jurisdiction is Shenandoah National Park – 23,110 acres and private lands – 1,112 acres. The acres burned by county included:

County	Inside Park	Outside Park	Total Acres
Madison	12,222	410	12,632
Page	2,061	8	2,069
Rappahannock	8,827	695	9,521
Totals	23,109	1,113	24,222

The fires include 14,829 acres within the designated Shenandoah Wilderness area.

Driven by high winds, the surface fire was fueled by grasses, shrubs, and leaf litter and burned in a mosaic pattern. Flames averaged only a few feet in height. Some small fingers of fire crowned on the south side of Old Rag Mountain, but for the most part the fires kept to the surface with low scorch heights. Suppression cost for the fires was $4,598,000 as of November 13.

The fires started on October 29. The Type I Pacific Northwest Incident Management Team (IMT) No. 3 (Stutler) was assigned and took over management of the fire on November 1, 2000 at 1800 hours. At the height of the incident, November 7, 2000, there were a total of 887 personnel committed to the fire. This included 24 handcrews, 7 helicopters, 47 engines, 6 dozers, and 3 water tenders. As of November 13, 2000, $4,598,000 had been spent in fire suppression costs. Fire suppression impacts included 11.9 miles of dozer line and 27.6 miles of hand line within 36.6 miles of fire perimeter. The Incident Base Camp was located at the Maintenance Facility at Park Headquarters.

The IMT recommended that the park request the BAER Team. Shenandoah National Park requested the Department of the Interior (DOI) Burned Area Emergency Rehabilitation (BAER) Team (Gasser) and they were ordered on November 11. The BAER Team reported to the fire on November 13. Upon arrival at the Shenandoah Fire Complex, the BAER Team was requested by the park to prepare a BAER plan to address potential effects of the fire and fire suppression impacts to all jurisdictions affected by the fire. Seven BAER Team members responded to the incident and the park provided a number of resource specialists to assist in resource data collection, information compilation, and plan preparation.

Because the BAER Team arrived on the same day as control of the fire, the team's request for an extension of the due date of the BAER Plan to November 23, was approved.

On November 14, the BAER Team issued a news release about the team and its objectives. On November 17, a media event was conducted along Skyline Drive at Meadow Springs parking area and Pinnacles overlook, providing preliminary findings and identifying proposed emergency fire rehabilitation treatments. A briefing package provided to the media can be found in Appendix V.

The BAER Team, tasked with evaluation of short and long-term emergency fire rehabilitation needs, developed this plan to address the following issues:

- Protection of human life, public safety, property, and critical cultural and natural resources.
- Cultural and natural resource values impacted by the fire or fire suppression actions.
- Facilities, roads and other improvements impacted by the fire or the suppression of the fire.
- Assessment of watershed stability relating to the protection of human life, property, and critical cultural and natural resources.
- Coordination of Emergency Fire Rehabilitation treatments on NPS lands.
- Rehabilitation requirements established by Federal law, policies, and relevant agency resource management mandates.
- Water quality.
- Protection of Threatened and Endangered (T&E) species habitat.
- Noxious weed and invasive species establishment and expansion within the fire area.
- Implementation of treatments in a timely manner, prior to the first damaging storms.

RESOURCE DAMAGES AND THREATS TO HUMAN SAFETY AND RESOURCES

Even though this fire was the largest in the park's history, its effect on the park's cultural and natural resources was minimal. The Shenandoah Fire Complex impacted 24,222 acres, on public and private lands within 36.6 miles of fire perimeter. Fire suppression impacts included, approximately 11.9 miles of dozer line, 27.6 miles of hand line, 18 drop points, 4 radio repeater locations, and the Incident Base Camp located at the park's Maintenance Facility. The fire had minimal effects to both cultural and natural resources. However, a cultural resource damage assessment will need to be completed to determine if any protective treatments will be necessary. The other major concern, as a result of this fire, is the potential for non-native plant invasion. A summary of the fire effects to cultural and natural resources follows:

Soil and Watershed - The burned area has been mapped by the BAER Team for burn severity. Fire consumed mostly ground fuels and leaf litter. In many cases, the leaf litter was charred but not completely consumed. However, the effective ground cover in these areas has been reduced. Moderate to strong hydrophobicity (water repellency) was found in some areas but is very spotty and covers only 15 to 20% of the burn area. A few areas have strong water repellency, but these areas had strong water repellency prior to the fire. Nearly all soils have a dense network of fine roots near the surface that were

not damaged by the fire and will reduce erosion. In addition, most of the soils have a large amount of rock fragments on the surface that will offer additional protection from erosion. The vast majority of the burn area was low burn severity. All of the above factors combine to create a situation where a significant increase in runoff or erosion is not expected. Because of the low burn severity, impacts to human life, property, and critical natural and cultural resources within and downstream of the burned areas are expected to be minimal. No watershed treatments are recommended.

Vegetation Resources - Overall, the burn effects to the existing hardwood forest were found to be minimal. Large forest trees have survived within the majority of the burned area. There are some areas along Skyline Drive and in the forest where the above-ground portions of the mountain laurel have been killed. However, the laurel is still alive and will sprout vigorously from the base next spring. Invasion of non-native plant species has been the main concern of the vegetation specialists. Concern is highest in areas that have experienced vegetation removal from hotter burning (such as the overlooks) or areas affected by suppression activities such as fire lines created by bulldozers or hand crews. Plans are in place to monitor for vegetative recovery and non-native plant invasion within the burned area for the next three years; re-seed native grasses on very vulnerable sites (bulldozer lines, overlooks); and spot control, with herbicide, non-native plants, if they are found within the burn area. At several of the overlooks, the laurel has been lopped to stimulate resprouting. On the steeper slopes seeding will be accomplished by a hydroseeder which will also contain mulch. The seed mix will contain Virginia wildrye, switchgrass, big bluestem, and deertongue, which are all natives. Dropped trees have been bucked to remove the potential of them rolling down the slope onto Skyline Drive. Hazard trees have also been felled. The Incident Base Camp will be aerated.

Wildlife Resources - Two Federally listed Threatened and Endangered wildlife species are known to occur within the burned area. The Shenandoah salamander (*Plethodon shenandoah*) is known from three isolated populations within Shenandoah National Park. The Shenandoah salamander typically goes into overwintering hibernation following the first freeze, which has already occurred. There are two areas of Shenandoah salamander habitat within the burn. The larger area of the two was largely left unburned. The smaller area was burned through but only accumulations of leaves and other fine fuels were impacted. The fire had no effect on the salamander.

The Peregrine falcon (*Falco peregrinus anatum*) is not known to inhabit areas within the park during the fall and winter months. The known eyrie in the area of the fire was not located within the burn itself. The fire had no effect on the falcon.

The fisheries within the park will have a short-term benefit as a result of the fire. Some trees that had to be cut for the fireline dropped into or across streams, which will provide habitat for fish and aquatic macroinvertebrates.

Archaeological/Cultural Resources - While some erosion is possible, it is not likely to further degrade cultural features within the burn area. The majority of cultural sites within the fire area date to the historic period. Because of their wooden construction, these sites are more vulnerable to damage by fire. While the fire was of low burn severity, it was hot enough to shatter surface artifacts. Firefighters protected the most significant standing structures, including the Jenkins and Corbin Cabins. A cultural resource damage assessment will be conducted of previously known sites within the burn to protect the sites from further damage, if necessary.

Aesthetic/Recreation Resources - Although the visual impacts of blackened areas are currently apparent in the burned area, continued leaf fall will disguise the blackness of the ash. By spring, most areas will begin to green-up as vegetation resprouts and continues its recovery. While all trails were reopened on November 17, hikers are encouraged to stay on the trails and are cautioned against fire-weakened trees and limbs, which can fall at any time. Backcountry camping is temporarily prohibited in the following areas: Nicholson Hollow, Corbin Cabin Cutoff, and Indian Run Trails for resource protection. Corbin Cabin is closed until Memorial weekend.

In completing its assessment of the burned area, the BAER Team conducted aerial and ground surveys to identify impacts and compile the following recommendations for rehabilitation of affected lands:

Fire Suppression Treatments:

- Inventory dozer lines for potential archaeological sites prior to rehabilitation
- Rehabilitate 11.9 miles of dozer line (2.2 miles by park, 9.7 miles by Virginia Department of Forestry, completed)
- Rehabilitate 27.6 miles of handlines (completed)
- Rehabilitation of 18 drop points and 4 radio repeater locations, not necessary
- Aerate the turf at the Incident Base Camp (Maintenance Facility)

Emergency Fire Rehabilitation Treatments:

- Conduct cultural resource damage assessments of known/documented sites and install protective treatments, if necessary
- Protect Threatened and Endangered species – plants
- Non-native invasive plant control – control and seeding
- Monitor noxious weeds and control
- Monitor vegetative recovery
- Reestablish long-term monitoring plots

Specifications were developed for all actions meeting the requirements of fire suppression or Emergency Fire Rehabilitation.

This BAER Plan is the initial funding request for Emergency Fire Rehabilitation (EFR) funds. This plan may also be used as a justification to seek funding from other sources for treatments proposed/recommended that are not covered by EFR. Additional supplemental requests may be made after this document has been reviewed and approved by the Northeast Regional Office. It is recommended that supplemental requests be made on an annual basis.

The Emergency Fire Rehabilitation funding for this plan extends over three years from the date of plan approval. At the conclusion of the funding period, a final Accomplishment Report will be due to the Regional Office. The Accomplishment Report will document the funding received (initial and supplemental funding), treatments installed, the effectiveness of the installed treatments, and the results of monitoring activities. A template for this report is provided with the transmittal memorandum to the park.

This BAER Plan was submitted to Shenandoah National Park in accordance with BAER policy and guidelines in accordance with the extension request.

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U.S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART A FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	Shenandoah Complex	**Date Contained**	November 12, 2000
Fire Number	P86001	**Date Controlled**	November 13, 2000
Agency Unit	NPS – Shenandoah National Park		
Region	North East	**Jurisdiction**	**Acres**
State	Viginia	**NPS**	23,109
County(s)	Page Rappahannock Madison	**Private**	1,113
Ignition Date/Manner	Human Caused	**TOTAL ACRES**	**24,222**

PART B NATURE OF PLAN

I. Type of Plan (check one box below)

	Short-term Rehabilitation (Complete Parts A, B, C, and H only)
	Long-term Rehabilitation (Complete all parts)
√	**Both Long and Short-term Rehabilitation (Completed all Parts)**

II. Type of Action (Check One box below)

√	**Initial Submission**
	Updating Or Revising The Initial Submission
	Supplying Information For Accomplishment To Date On Work Underway
	Different Phase Of Project Plan
	Final Report (To Comply With The Closure Of The EFR Account

PART C REHABILITATION ASSESSMENT

I. Rehabilitation Objectives:

- Locate and stabilize severely burned slopes which pose a direct threat to human life, property or critically important cultural and natural resources.
- Recommend post-fire rehabilitation prescriptions which prevent irreversible loss of natural and cultural resources.
- As practical and necessary, restore natural conditions to areas disturbed by fire suppression actions.
- Conduct immediate post-burn reconnaissance for fire suppression related impacts to threatened and endangered (T&E) species, and cultural sites.
- Provide long-term monitoring recommendations intended to ensure the success of rehabilitation efforts.



U.S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART D TEAM ORGANIZATION, TEAM MEMBERS, RESOURCE ADVISORS

I. BAER TEAM MEMBERS

POSITION	TEAM MEMBER / AGENCY
Team Leader	Erv Gasser, NPS
Archaeologist	Chuck James, BIA
Wildlife	Jim Atkinson, Shenandoah NPS Staff
Soil & Watershed	Norm Ambos, USFS Becca Smith, NPS
Vegetation	Jim Youtz, BIA Wendy Cass, Shenandoah NPS Staff Tom Blount, Shenandoah NPS Staff
Environmental Protection	Jim Akerson, Shenandoah NPS Staff
GIS	Marisa Stradley, Confederated Tribes of Warm Springs Dan Hurlbert, Shenandoah NPS Staff
Computer / Documentation	Richard Inman, BIA

Miscellaneous Support Personnel

Documentation	Debbie Sanders, Shenandoah NPS Staff
Computer / Documentation / GIS	Alan Williams, Shenandoah NP Contractor

III. Resource Advisors: (Note: Resource Advisors are individuals who assisted the BAER Team with the preparation of this plan. See Part H of this plan for a full list of agencies and individuals who were consulted or otherwise contributed to the development of this plan.

NAME	AFFILIATION, SPECIALTY
Steve Bair	NPS, Resource Specialist
Shawn Green	NPS, Resource Specialist
Mellisa Karaosky	NPS, Biological Science Technician
David Demarest	NPS, Biological Science Technician
Ron Nemes	NPS, Biological Science Technician
Jamie Bennett	NPS, Archaeologist
Ryan Kimberely	NPS, Archaeological Technician
Sandra Arnold	NPS, Archaeological Technician
Shane Spitzer	NPS, Environmental Protection Specialist

U.S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART D SUMMARY OF APPROVAL AUTHORITIES – NATIONAL PARK SERVICE

ACTIVITIES REQUIRING SUPERINTENDENT APPROVAL Fire Suppression Damages (charged to Fire Suppression)	**STATUS CODE**	**COST**
C-1a Cultural Resources Damage Assessment, (Suppression)	P	$6,830
F-1 Base Camp Rehabilitation	P	$250
W-1b Stabilization of Dozer Line	C	$950
SUBTOTAL		**$8,030**

Status Code: C=Completed; O-Ongoing; P=Planned

ACTIVITIES REQUIRING NIFC OFFICE APPROVAL Long-term EFR Rehabilitation request (charged to EFR)	**STATUS CODE**	**COST**
C-3 Cultural Resources Damage Assessment (Known Sites)	P	$22,980
M-1a Monitoring Vegetation	C,P	$6,240
M-1b Monitoring: Vegetation Recovery	P	$7,904
N-1a T&E Plant Assessment	P	$1,015
N-2a Non-Native Invasive Plant Control – Broadcast Seeding	P	$1,920
N-2b Non-Native Invasive Plant Control	P	$17,532
N-2c Non-Native Invasive Plant Control - Hydroseeding	C	$20,400
P-1 Long-Term monitoring Plot Re-establishment	P	$17,280
SUBTOTAL		**$95,271**

Status Code: C=Completed; O-Ongoing; P=Planned

TOTAL REHABILITATION COST - NATIONAL PARK SERVICE	**$103,301**

U.S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART E SUMMARY OF ACTIVITIES

The SUMMARY OF ACTIVITIES table identifies *trackable* rehabilitation costs charged or proposed for funding from fire suppression rehabilitation, emergency fire rehabilitation, emergency watershed protection, agency operations, and other. Only trackable expenditures are displayed in the total cost column. They are coded with the appropriate cost authority. The total cost of the rehabilitation effort to date, excluding the costs absorbed by the fire (fire crew, labor and associated overhead) is displayed as either Fire Suppression Rehabilitation (**F**), Emergency Fire Rehabilitation (**EFR**), Emergency Watershed Protection (**EWP**), or Agency Operations/Other (**OP/O**).

Shenandoah Fire Complex

(FUNDING SUMMARY - ESTIMATED TOTAL $)



PART E - SUMMARY OF ACTIVITIES - COST SUMMARY TABLE - SHENANDOAH FIRE COMPLEX

PART E LINE ITEM	UNIT	UNIT COST	# OF UNITS	COST BY FUND SOURCE				IMPLEMENTATION METHOD	SPECIFICATION TOTAL
				FIRE	EFR	OP/O	EWP		
C-1a Cultural Resources Damage	Site	$341.50	20	$6,830				P	
C-3 Cultural Resources Damage	Site	$191.50	120		$22,980			P	$22,980
F-1 Base Camp Rehabilitation	ICP	$250	1	$250				C	$250
F-2 Rehabilitate Dozer Lines	Miles		2.2					P	0
M-1a Monitoring, Vegetation	Acres	$.26	24222		$6,240			C/P	$6,240
M-1b Monitoring, VegetationRecovery	Inven.	$7,904	1		$7,904			P	$7,904
N-1a T&E Plant Assessment	Species	$7	145		$1,015			P	$1,015
N-2a Non-Native Invasive Plant Control - Broadcast seeding	Acres	$192	10		$1,920			P	$1,920
N-2b Non-Native Invasive Plant Control	Treatment	$5,652	3		$17,532			P	$17,532
N-2c Non-Native Invasive Plant Control - Hydroseeding	Acres	$1,360	15		$20,400			C	$20,400
P-1 Long-Term Monitoring Plot Re-establishment	Plot	$360	48		$17,280			P	$17,280
W-1b Stabilization of Dozer	Acres	$190	5	$950				C	$950
TOTAL COST FOR FIRE				**$8,030**	**$95,271**				**$103,301**

COST: F=Suppression; EFR=Long-term Rehab; OP=Base Funding; **METHOD:** FC=Crews Assigned to Fire; C=Contract; EFC=Emergency Fire Contract; P=Agency Personnel

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**SUPPRESSION IMPACTS AT ARCHEOLOGICAL SITES**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**C-1a Cultural Resources Damage Assessment, (Suppression)**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: To conduct post-fire cultural resource damage assessment resulting from fire suppression and their proposed rehabilitation activities at 20 previously documented sites. Eighteen sites are associated with trails used as fire lines and two sites with dozer lines.

B. Location (Suitable) Sites: Dozer lines and hand lines on the Shenandoah Fire Complex, including portions of the Appalachian, Corbin Cabin, Corbin Cabin Cutoff, Corbin Mountain, Crusher Ridge, Indian Run, Meadow Spring, Old Rag Saddle, Old Rag Ridge and White Rocks trails. Information specific to the location and description of these cultural resources is sensitive and exempt from public disclosure under the Freedom of Information Act and the Archaeological Protection Act.

C. Design/Construction Specifications:

1. Assess sites within hand and dozer lines for damages due to suppression efforts. Work is to be completed within seven weeks of fire control.

2. Record and map information about each site on the Shenandoah Fire Complex Emergency Post-Fire Inspection Form (Appendix V).

3. Prescribe and implement specific site treatments, if necessary. Assessment and treatment of sites is charged to the fire account.

D. Purpose of Treatment Specifications: To stabilize and prevent unacceptable degradation of critical cultural resources due to suppression impacts. Any proposed treatment will meet legislative mandates of the National Historic Preservation Act, the Archeological Resources Protection Act, associated Federal regulations, and NPS Special Directive 87-3, "Conservation of Archeological Resources"**.**

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
1 GS-11 Archeologist @ 28.35 /hr x 80 hours = 2 GS-5 Archeologists @ 14.95/hr. x 160 hours =	$2,268 $2,392
TOTAL PERSONNEL SERVICE COST	$4,660
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost/item benefits over lease or rental.)	**COST/ITEM**
1 GSA 4-wheel drive vehicle @1500/mo. X 1 mo. + .17/mi x 1000 miles =	$1,670
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	$1,670
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
Archeological field supplies, including film and film processing for 10 rolls	$500
TOTAL MATERIALS AND SUPPLY COST	$500

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	COST/ITEM
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Archeological Site	$341.50	20	$6,830	F	P
FY 2						
FY 3						
TOTAL		$341.50	20	$6,830	F	P

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P, M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendix I, Cultural Resource Assessment. See Appendix V, Shenandoah Fire Complex Emergency Post-Fire Inspection Form.

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**DAMAGE ASSESSMENT FOR PREVIOUSLY KNOWN OR DOCUMENTED SITES**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**C-3 Cultural Resources Damage Assessment, (Known sites)**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Assess damages from fire effects and assess the risk of accelerated erosion upon previously known or documented sites within the Shenandoah Fire Complex. Identify and install mitigation treatments to protect sites at risk.

B. Location (Suitable) Sites: Excluding fire lines, approximately 157 known or documented sites, including historic (standing and collapsed structures, cemeteries/graveyards, fieldstone walls and cultural landscapes) and prehistoric sites are within the Shenandoah Fire Complex. Information specific to the location and description of these cultural resources is sensitive and exempt from public disclosure under the Freedom of Information Act and the Archaeological Resources Protection Act.

C. Design/Construction Specifications:

1. Visit and evaluate 120 sites within the perimeter of the burned area that are subject to fire effects. These evaluations should be completed within 90 days from the control of the fire, or as weather permits, prior to May, 2001.

2. Complete a Shenandoah Fire Complex Emergency Post-Fire Inspection Form (Appendix V) for each site. Site damage assessments should include fire effects such as loss of sill or retaining walls, fire-killed trees in or on site features, increased visibility and vulnerability to looting.

3. Develop mitigation or rehabilitation measures for each site threatened by accelerated erosion or destabilization as a result of fire effects. Prepare a supplemental request for funding to install needed protection treatments. Coordinate with law enforcement on sites vulnerable to looting.

D. Purpose of Treatment Specifications: To stabilize and prevent unacceptable degradation of critical cultural resources due to fire. To meet the legislative mandates of the National Historic Preservation Act, the Archeological Resources Protection Act, NPS Special Directive 87-3, "Conservation of Archeological Resources", and associated Federal regulations**.**

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
1 GS-11 Archeologist @ 28.35 /hr x 320 hours = 2 GS-5 Archeologists @ 14.95/hr. x 640 hours =	$9,072 $9,568
TOTAL PERSONNEL SERVICE COST	$18,640
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost/item benefits over lease or rental.)	**COST/ITEM**
1 rental 4-wheel drive vehicle @1500/mo. X 2 mo. + .17/mi x 2000 miles =	$3,340
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	$3,340
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
Archeological field supplies, including film and film processing for 20 rolls	$1,000
TOTAL MATERIALS AND SUPPLY COST	$1,000

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	COST/ITEM
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Archeological Site	$191.50	120	$22,980	EFR	P
FY 2						
FY 3						
TOTAL		$191.50	120	$22,980	EFR	P

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P, M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendix I, Cultural Assessment. See Appendix V, Shenandoah Fire Complex Emergency Post-Fire Inspection Form
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U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**AERATE LAWN USED FOR PARKING AT BASE CAMP**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**F-1 Base Camp Rehabilitation**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Contract to have lawn aerated where vehicles were parked at base camp. Procedure will ameliorate compaction and promote healthy grass turf.

B. Location (Suitable) Sites: Lawn adjacent to base camp.

C. Design/Construction Specifications: Practice shall consist of soil plug aeration of the entire grass area (approx. half an acre) used for base camp parking. Aeration shall be done with a double coverage method by first passing in one direction then second pass at right angles to the first. Plugs should be extracted to a depth of 2-4 inches according to standard turf management practices.

D. Purpose of Treatment Specifications: Reduce compaction of soil, promote water infiltration, and promote healthy turf.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL TRAVEL COST	

CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	COST/ITEM
Contract labor and equipment @ $250 for half day.	$250
TOTAL CONTRACT COST	$250

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	ICP	$250	1	$250	F	C
FY 2						
FY 3						
TOTAL		$250	1	$250		

FUNDING SOURCES:
F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:
P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	C
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendix I, Vegetation Assessment and Appendix III, Suppression Impacts/Treatments Map.

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**REHABILITATE DOZER LINES**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**F-2 Rehabilitate dozer lines**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: As conditions permit, but as soon as possible, the dozer lines along the powerline will be rehabed by a dozer.

B. Location (Suitable) Sites: The dozer lines along the powerline near Thornton Gap. See Suppression Impacts/Treatments Map for specific locations.

C. Design/Construction Specifications:

1. Pull berms: Pull soil berms back into center of dozer lines, smooth out soil.

2. Rolling dips: Construct drivable rolling dips along dozer lines on slopes as follows.
- Every 250 feet for 2% slopes
- Every 135 feet for 5% slopes
- Every 80 feet for 10% slopes
- Every 60 feet for 15% slopes
- Every 45 feet for 20% slopes
- Every 35 feet for 30% slopes

3. Block access: Place large rocks or logs at the eastern end of the dozer line to discourage ATV access to the dozer line from the Buck Hollow Trail.

* A cultural resource specialist must be present during equipment operation to locate any cultural sites along the dozer lines that are not to be disturbed.
* The dozer lines will be seeded: See Spec W-1c Stabilization of Dozer line.

D. Purpose of Treatment Specifications: Specification is intended to aid in rehabilitating dozer lines within fire area to prevent erosion.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
NPS dozer operator	F
TOTAL PERSONNEL SERVICE COST	$0
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
NPS dozer	F
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	$0
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL MATERIALS AND SUPPLY COST	

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	COST/ITEM
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Miles	-	2.2	-	F	P
FY 2						
FY 3						
TOTAL	Miles	-	2.2	-	F	P

FUNDING SOURCES:

F = Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required – cost charged to Fire Suppression Account.	F

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendix I, Vegetation Assessment and Appendix III, Suppression Impacts/Treatments Map.

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**COLOR AERIAL PHOTOGRAPHY**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**M-1a Monitoring: Vegetation**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Air photography flight to provide coverage at specified scale, with standard stereo overlap used for photogrammetric purposes.

B. Location (Suitable) Sites: Shenandoah Fire Complex. The entire burned area on the Shenandoah National Park with perimeter overlap consisting of at least one photo exposure, approximately 24,222 acres.

C. Design/Construction Specifications: Flight @ 1:12,000 nominal scale to consist of approximately 47 linear miles of flight line. The exposure frequency and flight line controls to conform to USDA Farm Service standards for stereo overlap, geoposition, nominal scale, and flight line drift. Color prints and Mylar overlays should also conform to agency standards. Flight to be conducted during early summer season.

D. Purpose of Treatment Specifications: This general purpose baseline data will be used as a tool for documentation, monitoring, and activity project planning for potential control of non-indigenous plants.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
15% agency administrative fee for photography flight (contract preparation, quality control, etc.)	$300
TOTAL PERSONNEL SERVICE COST	$300
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
	N/A
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	$0
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL MATERIALS AND SUPPLY COST	$0
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	**COST/ITEM**
	N/A
TOTAL TRAVEL COST	$0

CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	COST/ITEM
47 miles of flight line photography @ $120 per linear mile.	$5,640
2 complete sets of 1:12,000 nominal scale color positive paper prints (9 ½" X 9 ½") @ $120 per set.	$240
1 mylar spot index and flight line transparencies @ $60 per mylar spot index.	$60
TOTAL CONTRACT COST	$5,940

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	ACRES	$0.26	24,222	$6,240	EFR	C,P
FY 2						
FY 3						
TOTAL	ACRES	$0.26	24,222	$6,240	EFR	C,P

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	C
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendix I, Vegetation Assessment.

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**VEGETATION MONITORING**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**M-1b Monitoring: Vegetation Recovery**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Use existing trails and approximately 15 vegetation transects to monitor woody regeneration and non-indigenous species presence in areas of high gypsy moth mortality. Monitor seeded areas to assess seeding effectiveness and presence of non-indigenous species to determine if re-treatment or control is necessary.

B. Location (Suitable) Sites: In addition to using the established trail network within the burn area, five groups of transects will be established within the fire boundary for monitoring purposes. Survey work will also be completed on seven re-seeding sites, and around two developed areas within the burn perimeter (refer to Vegetation Treatments Map).

C. Design/Construction Specifications:

1. Establish plots at the seven re-seeding sites, and near two developed areas, and monitor for non-indigenous vegetation 2 times (spring and fall).

2. Use aerial photos and field surveys to confirm locations of high tree mortality indicated by GIS analysis. Approximately 500 acres total will be selected for this monitoring.

3. At each of the five monitoring stations transects will originate at trails adjacent to areas of severe gypsy moth mortality. Transects will be spaced along the length of the trail and will be oriented to extend into the mortality area.

4. Non-indigenous species will be surveyed along the entire length of each transect twice a year. Woody regeneration will be sampled in circular plots established along each transect at the end of the first growing season.

5. Transects will be photographed and locations of non-indigenous plants will be added to the park GIS.

6. Results of monitoring will be documented, analyzed and summarized for the first year accomplishment report.

7. Any necessary treatments will be identified for implementation and supplemental funding requests submitted if warranted.

D. Purpose of Treatment Specifications: To monitor the status of target exotic species within the burn area. To monitor seeding effectiveness. To determine if sufficient regeneration of native woody species is occurring within areas of severe gypsy moth mortality, which were more severely impacted by fire than the remainder of the burned area. If revegetation is unsatisfactory, or if non-desirable plant occurrences become widespread, a new specification and supplemental funding may be warranted.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
GS-05 Technicians @ $12.35 (FY2001) x 4 people x 160 hours =	$7,904
TOTAL PERSONNEL SERVICE COST	$7,904
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	COST/ITEM
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Inventory	$7,904	1	$7,904	EFR	P
FY 2						
FY 3						
TOTAL		$7,904	1	$7,904	EFR	P

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendix I, Vegetation Assessment and Appendix III, Vegetation Monitoring Map

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**T & E PLANT SPECIES POST-FIRE ASSESSMENT**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**N-1aT&E Plant Assessment**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Assess and document post-fire effects on seven previously documented state rare plant species found within the fire perimeter: American fly honeysuckle (*Lonicera canadensis*, G5, S3); round-leaf pyrola (*Pyrola elliptica*, G5, S2); quaking aspen (*Populus tremuloides*, G5, S2); Appalachian fir clubmoss (*Huperzia appalachiana*, G4/G5, S2); rand's goldenrod (*Solidago randii*, G4, S2S3); bristly sarsaparilla (*Aralia hispida*, G5, S2); and round-leaf dogwood (*Cornus rugosa*). For the purposes of mitigation, if monitoring indicates negative fire effects on these plant populations, then mitigation treatment will be conducted. Follow-up treatments can consist of collecting and increasing seed (if located in other areas throughout the park), and propagation of plants to be returned to its critical habitat.

B. Location (Suitable) Sites: On known habitat within the fire perimeter, according to detailed distribution map (confidential).

C. Design/Construction Specifications: As determined by agency botanist in consultation and coordination with the Virginia Department of Natural Heritage. Develop monitoring protocols and conduct field inventories of known pre-fire locations of rare species. All locations should be recorded with GPS and mapped in a GIS.

D. Purpose of Treatment Specifications: Evaluate fire effects on these sensitive species to document post-fire occurrence and mitigate damage to critical habitats. Determine follow-up treatment and inplant if recovery is negative. A supplemental request for funding will need to be completed if any mitigation or further monitoring is warranted.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
GS-11 Botanist @ $21.50 hour x 30 hours = $645 GS-05 Technician @ $12.35 hour x 30 hours = $370	$1,015
TOTAL PERSONNEL SERVICE COST	$1,015
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL TRAVEL COST	

CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	COST/ITEM
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Species	$145	7	$1,015	EFR	P
FY 2						
FY 3						
TOTAL		$145	7	$1,015	EFR	P

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report:
See Appendix I, Vegetation Assessment and Appendix III, Vegetation Monitoring Map.

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**CONTROL OF NON-INDIGENOUS INVASIVE PLANTS – BROADCAST SEEDING**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**N-2a Non-native invasive plant control – Broadcast seeding**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Seed native grasses on burned and/or suppression disturbed locations adjacent to non-indigenous invasive plant species.

B. Location (Suitable) Sites: Areas with pre-burn incidence of Japanese knot-weed and Japanese stilt grass, as identified on the non-indigenous invasive plants map, and vegetation treatment map. Two locations targeted for this practice aggregate approximately 10 acres.

C. Design/Construction Specifications:

1. SEED MIXTURE SELECTION AND CERTIFICATION: The seed mixture for this practice was selected by the BAER vegetation specialist and local agency resource advisors after consultation with other federal and state natural resource agency specialists, based upon agency policy, regulations and mandates. Seeds should be tested for purity and germination rates. Seed must be certified to be noxious weed free. Before procured seed will be accepted, the contract supplier must provide written evidence (seed label and letter) that the seed conforms to these purity and germination requirements in the specification. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analysts* will be acceptable for determining the germination rate. Seed designated without a purity or germination rate shall be labeled to include the name, date (month and year) collected, and the name and address of the seed supplier.

Broadcast Seed Mixture (% by weight)

Big Bluestem	*Andropyron gerardi*i	18.9 %
Deertongue	*Dicanthelium clandestinum*	18.2 %
Switchgrass	*Panicum virgatum*	10.7 %
Virginia Wildrye	*Elymus virginicus*	52.2%

2. EQUIPMENT REQUIREMENTS: Seed will be applied either by hand spreading, or with an ATV mounted seeder.

3. SEED MIXING: Mixed seeds will be supplied by the vendor for application. Since seeds are of different sizes and weights, care must be taken to ensure that seeds are evenly mixed prior to application to ensure uniform ground distribution. Since smaller and heavier seeds will settle to the bottom of the mix it may be necessary to periodically shake the transportation containers to redistribute seeds.

4. APPLICATION RATE: Seed will be applied at approximately 16.7 pounds **Pure Live Seed** per acre (80 PLS/ square foot). Actual bulk mix will represent more weight for application.

5. Seed will be applied as soon as possible to permit overwinter seed stratification and early spring germination.

D. Purpose of Treatment Specifications: Reduce potential for establishment of undesirable plants. Potential future control costs will be minimized by successful establishment of perennial native cover.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
GS-5, Biological Technician (2) @ $12.35/hr. x 20 hours x 2	$500
TOTAL PERSONNEL SERVICE COST	$500
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
16.7 PLS pounds seedmix/acre @ $ 8.50/lb. x 10 acres	$1,420
TOTAL MATERIALS AND SUPPLY COST	$1,420
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Acres	$192	10	$1,920	EFR	P
FY 2						
FY 3						
TOTAL		$192	10	$1,920		

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P, M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report:
See Appendix I, Vegetation Assessment and Appendix III, Vegetation Treatments Map

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**SPOT CONTROL OF NON-INDIGENOUS SPECIES**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**N-2b Non-Native Invasive Plant Control**	**FISCAL YEAR(S) (list each year):**	**2001, 2002, 2003**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Based on the results of monitoring, non-native invasive plants which are found to be invading areas within the burn will be treated. Treatments will include herbicide application (both basal and foliar applications), manual cutting, and hand pulling.

B. Location (Suitable) Sites: Shenandoah Fire Complex areas including areas adjacent to known non-native species infestation areas and forest interior areas with prior forest disturbances but no known non-native species populations.

1. Areas adjacent to currently known infestation zones include the powerline right-of-way constituting the north fire boundary, Skyline Drive at five overlooks and intermediate ditch lines, Pinnacles dumpsite, Old Rag Shelter and connecting access roads, and Panorama entrance area. Each of these zones has heavy concentrations of highly invasive vegetation such as Oriental bittersweet, Japanese honeysuckle, Japanese stiltgrass, and Japanese knotweed, among others.

2. Interior forest areas which may be susceptible to non-native species invasions include burned areas with prior forest disturbances such as areas with severe gypsy moth mortality. Forest succession may have been set back in these areas due to the fire and if infected with invasive non-native species, the areas could become refugia for non-native species to spread in backcountry areas.

C. Design/Construction Specifications:

1. Invasive plants will be evaluated and the most cost effective treatments available will be utilized.

2. Costs estimates include labor, supplies/equipment and transportation.

D. Purpose of Treatment Specifications: To control isolated populations of invasive non-native vegetation within burned area. If infestations become widespread then a request for supplemental funding for more intensive control methods may be needed.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
2 GS-0404-5 @ $12.35/hr. X 160 hr. X 3 fiscal years = $12,432 (costs include 4.8% inflation/year)	$12,432
TOTAL PERSONNEL SERVICE COST	$12,432
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
Equipment: Field equipment, equipment repair @ $500/yr. = $1,500	$1,500
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	$1,500
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
Supplies: Herbicides, personal protective gear, misc. supplies @ $500/yr. X 3 yr. = $1,500	$1,500
TOTAL MATERIALS AND SUPPLY COST	$1,500

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	COST/ITEM
Vehicle Rental: 1 pickup for a month @ $700 X 3 yr. = $2100	$2,100
TOTAL TRAVEL COST	$2,100
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Treatment	$5,652	1	$5,652	EFR	P
FY 2	Treatment	$5,841	1	$5,841	EFR	P
FY 3	Treatment	$6,039	1	$6,039	EFR	P
TOTAL	Treatment	$17,532	3	$17,532	EFR	P

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	C
4. Estimates based upon government wage rates and material cost.	P,M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendix I, Vegetation Assessment, Appendix III, Intensive Vegetation Monitoring Map, and Appendix III, Vegetation Treatment Map.

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**CONTROL OF NON-INDIGENOUS INVASIVE PLANTS – HYDROSEEDING**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**N-2c Non-native invasive plant control - Hydroseeding**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Seed native grasses on burned and/or suppression disturbed areas adjacent to Skyline Drive.

B. Location (Suitable) Sites: Parking turn-out areas, steep cut slopes (within 50' from roadway), and drainage ditches adjacent to Skyline Drive where it passes through the burned area. Approximately 15 acres.

C. Design/Construction Specifications:

1. SEED MIXTURE SELECTION AND CERTIFICATION: The seed mixture for this practice was selected by the BAER vegetation specialist and local agency resource advisors after consultation with other federal and state natural resource agency specialists, based upon agency policy, regulations and mandates. Seeds should be tested for purity and germination rates. Seed must be certified to be noxious weed free. Before procured seed will be accepted, the contract supplier must provide written evidence (seed label and letter) that the seed conforms to these purity and germination requirements in the specification. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analysts* will be acceptable for determining the germination rate. Seed designated without a purity or germination rate shall be labeled to include the name, date (month and year) collected, and the name and address of the seed supplier.

Broadcast Seed Mixture (% by weight)

Big Bluestem	*Andropyron gerardi*i	18.9 %
Deertongue	*Dicanthelium clandestinum*	18.2 %
Switchgrass	*Panicum virgatum*	10.7 %
Virginia Wildrye	*Elymus virginicus*	52.2%

2. EQUIPMENT REQUIREMENTS: Seed will be applied by using hydroseeding equipment with 200' live reel hose capability.

3. SEED MIXING: Mixed seeds will be supplied by the vendor for application. Since seeds are of different sizes and weights, care must be taken to ensure that seeds are evenly mixed prior to application to ensure uniform ground distribution. Since smaller and heavier seeds will settle to the bottom of the mix it may be necessary to periodically shake the transportation containers to redistribute seeds.

4. APPLICATION RATE: Seed will be applied at approximately 16.7 pounds **Pure Live Seed** per acre (80 PLS/ square foot). Actual bulk mix will represent more weight for application.

5. Seed will be applied as soon as possible to permit overwinter seed stratification and early spring germination.

D. Purpose of Treatment Specifications: Reduce potential for establishment of undesirable plants. Potential future control costs will be minimized by successful establishment of perennial native cover. Hydroseeding will be easy to implement and is the most effective method of revegetating steep cut slopes adjacent to roadways.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	COST/ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
16.7 PLS pounds seedmix/acre @ $ 8.50/lb. x 15 acres = $2,129 Straw and other misc. materials = $ 250	$2,400
TOTAL MATERIALS AND SUPPLY COST	$2,400
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
Equipment and operators @ $1,200/acre x 15 acres	$18,000
TOTAL CONTRACT COST	$18,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Acres	$1,360	15	$20,400	EFR	C
FY 2						
FY 3						
TOTAL		$1,360	15	$20,400	EFR	C

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P, M
3. Estimate supported by cost guides from independent sources or other federal agencies.	M
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report:
See Appendix I, Vegetation Assessment and Appendix III, Vegetation Treatments Map

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**RE-INSTALL LONG-TERM MONITORING PLOTS**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**P-1 Long-term monitoring plot re-establishment**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Re-install 48 long-term monitoring plots located within the burn area using iron reinforcing bar and brass tags to replace melted PVC and aluminum tags.

B. Location (Suitable) Sites: The plots are found at the following 16 sites: 2L315, 2L105, 2L118, 2L317, 2L122, 2L314, 2L111, 2L113, 2L127, 2L313, 2L312, 2L100, 2L106, 2L108, 2L126, 2L132. Plot locations are displayed on the Vegetation Treatments Map. GPS coordinates can be found in park files.

C. Design/Construction Specifications:

1. Follow the Park's established protocols to re-install marking posts and tags at each monitoring plot.
2. Photo-document each plot.

D. Purpose of Treatment Specifications: To allow the continuation of long-term monioring for forest change within the Park.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
GS-11 Botanist @ $21.50/ hour x 30 hours x 1 year= $645 Four GS-05 Technicians @ $12.35/ hour x 240 hours x 1 year x 4 technicians = $11,856	$12,501
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
hand stamp steel die set @ $80 x 1 year - $80	$80
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	$80
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
6000 stainless steel nails, 5 inch @ $0.1685 per nail x 1 year = $1,011 2000 24 inch pieces of 0.5 inch rebar @ $1.02 per piece x 1 year = $2,040 6000 brass tree tags = $700 x 1 year = $700 200 0.5 inch rebar post caps @ $2.20 x 1 year = $440 2 gal. roof paint @ $30 gal. = $60 4 100m fiberglass tape measures @ $84 x 1 year = $336 8 rolls of film with processing @ $13 x 1 year = $104	$4,695
TOTAL MATERIALS AND SUPPLY COST	$4,695

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	COST/ITEM
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	PLOT	$360	48	$17,280	EFR	P
FY 2						
FY 3						
TOTAL		$360	48	$17,280		

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report:
See Appendix I, Vegetation Assessment and Appendix III, Vegetation Treatments Map.

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART F SPECIFICATIONS

SPECIFICATION TITLE:	**DOZER LINE REHABILITATION - SEEDING**	**JURISDICTIONS:**	**Shenandoah National Park**
PART E: LINE ITEM:	**W–1b Stabilization of Dozer Line**	**FISCAL YEAR(S) (list each year):**	**2001**

I. WORK TO BE DONE

NUMBER AND DESCRIBE EACH TASK:

A. General Description: Dozer line will be waterbarred with rolling dips and rock barriers placed to discourage ATV use. Dozer line will then be drill seeded with a native perennial grass seed mix to control erosion and reduce the spread of non-indigenous invasive plants.

B. Location (Suitable) Sites: All dozer lines installed for fire suppression within Shenandoah NP.

C. Design/Construction Specifications:

1. SEED MIXTURE SELECTION AND CERTIFICATION: The seed mixture for this practice was selected by the BAER vegetation specialist and local agency resource advisors after consultation with other federal and state natural resource agency specialists, based upon agency policy, regulations and mandates. Seeds should be tested for purity and germination rates. Seed must be certified to be noxious weed free. Before procured seed will be accepted, the contract supplier must provide written evidence (seed label and letter) that the seed conforms to these purity and germination requirements in the specification. Test methods specified in *Rules for Testing Seeds, Proceedings of the Association of Official Seed Analysts* will be acceptable for determining the germination rate. Seed designated without a purity or germination rate shall be labeled to include the name, date (month and year) collected, and the name and address of the seed supplier.

Broadcast Seed Mixture (% by weight)

Big Bluestem	*Andropyron gerardi*i	18.9 %
Deertongue	*Dicanthelium clandestinum*	18.2 %
Switchgrass	*Panicum virgatum*	10.7 %
Virginia Wildrye	*Elymus virginicus*	52.2%

2. EQUIPMENT REQUIREMENTS: Tractor or truck drawn rangeland seed drill and all necessary supplies for seeding mixture directly into the soil surface.

3. SEED MIXING: Mixed seeds will be supplied to the contractor for application. Since seeds are of different sizes and weights, care must be taken to ensure that seeds are evenly mixed prior to application to ensure uniform ground distribution. Since smaller and heavier seeds will settle to the bottom of the mix it may be necessary to periodically shake the transportation containers to redistribute seeds.

4. APPLICATION RATE: Seed will be applied at approximately 10.5 pounds **Pure Live Seed** per acre (50 PLS/ square foot). Actual bulk mix will represent more weight for application.

5. Seed will be applied as soon as possible to permit overwinter seed stratification and early spring germination.

D. Purpose of Treatment Specifications: To reestablish native vegetation on dozer fire lines to prevent soil erosion and reduce the opportunity for spread of non-indigenous invasive plants.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (GRADE @ COST/HOURS X # HOURS X # FISCAL YEARS = COST/ITEM): Do not include contract personnel costs here (see contractor services below).	**COST/ITEM**
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE OR RENTAL (Item @ Cost/Hour or Cost/Day X # Hours or # Days X # Fiscal Years = Cost/Item): (Note: Purchase requires written justification that demonstrates cost benefits over lease or rental.)	**COST/ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE, OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	**COST/ITEM**
10.5 PLS pounds seedmix/acre @ $ 8.50/lb. 11,000 ft. dozer line x 20' width (inc. push-outs and berms) = 5 acres	$450
TOTAL MATERIALS AND SUPPLY COST	$450
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X # Fiscal Years = Cost/Item):	**COST/ITEM**
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	**COST/ITEM**
Utility tractor, rangeland or grain drill, equipment operator (1 day)	$500
TOTAL CONTRACT COST	$500

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
FY 1	Acres	$190	5	$950	F	C
FY 2						
FY 3						
TOTAL		$190	5	$950		

FUNDING SOURCES:

F= Fire Suppression Account
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other
EWP = Emergency Watershed Program

METHODS:

P = Agency Personnel Services
C = Contract (Long-Term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	M
2. Documented cost figures from similar project work obtained from local agency sources.	C
3. Estimate supported by cost guides from independent sources or other federal agencies.	M
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report:
See Appendix I, Vegetation Assessment and Appendix III, Vegetation Treatment Map.

PART G POST-REHABILITATION RECOMMENDATIONS

I. Long-Term Monitoring:

- Monitor Seeding Effectiveness
- Monitor Water Quality
- Monitor Vegetative Recovery
- Monitor Threatened and Endangered Species
- Monitor Cultural Sites Treatments
- Maintain Installed Treatments

PART H CONSULTATIONS

National Park Service

Shane Spitzer, Environmental Protection Specialist, Shenandoah National Park	(540) 999 3434
Reed Engle, Branch Chief, Cultural Resources, Shenandoah National Park	(540) 999-3495
Jamie Bennett, Archaeologist, Shenandoah National Park	(540) 999-3493

U.S. Geologic Survey

Ben Morgan, Geologist, U.S. Geological Survey	(703) 648-6927

U.S. Fish and Wildlife Service

Andy Moser USFWS	(410) 573-4537

State of Virginia

Rick Reynolds VA Dept of Game and Inland Fisheries	(540) 248-9386
Kara Metz, Virginia State Historic Preservation Office, Department of Historic Resources	(804) 367-2323 ext. 105

U.S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN

PART I NATIONAL PARK SERVICE, SHENANDOAH NATIONAL PARK

I. SUPPRESSION RELATED REHABILITATION APPROVAL

☐ **Approved**

☐ **Approved with Revision**

☐ **Disapproved**

Explanation for Revision or Disapproval:

Douglas K. Morris, Superintendent, Shenandoah National Park Date

II. EMERGENCY FIRE REHABILITATION CONCURRENCE

☐ **Approved**

☐ **Approved with Revision**

☐ **Disapproved**

Explanation for Revision or Disapproval:

Marie Rust, Regional Director, Northeast Region Date

III. EMERGENCY FIRE REHABILITATION APPROVAL

☐ **Approved**

☐ **Approved with Revision**

☐ **Disapproved**

Explanation for Revision or Disapproval:

Stephen J. Botti, BAER Coordinator, Branch of Fire Management, NIFC Date

IV. OPERATIONAL BASE FUNDING APPROVAL

☐ **Approved**

☐ **Approved with Revision**

☐ **Disapproved**

Explanation for Revision or Disapproval:

Douglas K. Morris, Superintendent, Shenandoah National Park Date

APPENDIX I. BAER TEAM RESOURCE ASSESSMENTS

- CULTURAL RESOURCE ASSESSMENT
- SOIL AND WATERSHED RESOURCE ASSESSMENT
- THREATENED AND ENDANGERED PLANTS RESOURCE ASSESSMENT
- VEGETATION RESOURCE ASSESSMENT
- WILDLIFE RESOURCE ASSESSMENT

U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION TEAM

Shenandoah Fire Complex

CULTURAL RESOURCE ASSESSMENT

I. OBJECTIVE

Assess damage to known and documented archaeological sites, cultural landscapes, traditional cultural properties and historic structures from the adverse effects of wildland fire, suppression activities, and rehabilitation projects of the Shenandoah Fire Complex.

Conduct cultural resource inventory of land disturbance activities associated with the Shenandoah Fire Complex and recommend treatments of those sites adversely affected by suppression activities and rehabilitation projects in a manner that meets legal requirements.

II. ISSUES

Possible impacts to known prehistoric and historic resources resulting from fire suppression activities proposed rehabilitation activities and fire effects.

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Development of assessment and mitigation plans for those cultural resources that were affected by the Shenandoah Fire Complex.

Assess site vulnerability to looting.

III. OBSERVATIONS

A. Introduction

This report addresses the potential impacts from the Shenandoah Fire Complex to cultural resources within the Shenandoah National Park. The man-caused Shenandoah Fire Complex incident began on October 29 at 1400, when the Pinnacles and Rapidan Road Fires were reported. The Rapidan Road fire was contained at 25 acres. On October 30, at 1800, the Old Rag Fire was reported. Prior to containment the Pinnacles and Old Rag Fires burned together. Referred to as the Shenandoah Fire Complex, these fires burned over 24,222 acres of land. Of this total, 14,829 acres are within the Shenandoah Wilderness, and 1,113 acres are located on private lands in Madison, Page and Rappahanock Counties, Virginia. The elevation of the incident ranges between 840 and 3,730 feet. The fire behavior consisted primarily of a low intensity, low severity understory burn. The fires were contained on November 12 and were declared controlled on November 13, 2000 at 1800 hours. There were 2.2 miles of bulldozer line (along a major regional power line) and 27.64 miles of hand line (most on established hiking trails) were within the park boundaries.

B. BACKGROUND

The Shenandoah Fire Complex is located on the east and west slopes of the Blue Ridge Mountains, a part of the larger Appalachian Mountains. These mountains form a barrier between the broad, eastern piedmont (foothill/coastal plains) and the valley and ridge system to the west. A number of landscapes in this area favor human use and settlement. These include the watered valleys or hollows that are found at the lower elevations, smaller mid-slope valleys and flats, ridgelines and gaps.

The archaeological and historic discussions that follow come from Horning (1999), and Crandall and Engle (1997). Based on these authors, the prehistoric settlement system of this area of the Blue Ridge Mountains reflects the following sequence of cultural occupation:

The Paleo-Indian Period: +10,000-8,000 B.C. The land was first used shortly after the glaciers retreated and the area became habitable. Hunting of megafauna and other large mammals occurred during this period along with other resource exploitation and procurement activities. While evidence of this period within the Shenandoah NP has not been identified, a site dating to this period is located just outside park boundaries. Sites dating to this period are expected to occur in the park due to the proximity of this site and the natural resources the park had to offer.

The Archaic (8,000 to 1,000 B.C.) has been broken into The Early, Middle, and Late Archaic periods. As the climate became more temperate, a greater diversity of flora and fauna was available for exploitation. The first major use of the Blue Ridge uplands occurred during the Early Archaic as seasonally available resources became available. This time is also seen as a transition from the earlier Paleo-Indian Period. During the Late Archaic, use of the Blue Ridge was intensified. Plant domestication is believed to have developed towards the end of this period.

The next prehistoric sequence is referred to as the Woodland Period (1,000 B.C. to around A.D. 1700). It is divided into Early, Middle and Late phases. Pottery appears during the early phase and becomes common by A.D. 800. Agriculture becomes more dominant around this time in the Piedmont and Valley. The population also becomes more sedentary during this period. Trade networks across the mountains appear to be fully developed during this time.

In 1669, the Monacans and Manahoacs were noted as living just east of the Blue Ridge Mountains, although their populations were decimated by disease in the early 1700's (American Park Network 2000:28-29). These Tribes may have been further impacted by the Iroquois Confederacy's effort in the north to control the fur trade (Crandall and Engle 1997:38). The loss of population in this area may, in part, explain why Souian tribes were noted as moving south in 1706 (Crandall and Engle 1997:38). Around the same time, another traveler noted the area was used for hunting by the Shawnee, Iroquois, and Susquehannock (Horning 1999:5).

Historic European exploration of the area was underway by 1669. By the 1720's, settlement of the Shenandoah Valley began, with the settlers crossing over the Blue Ridge from Eastern Virginia or coming down the valley from Pennsylvania and Maryland (Crandall and Engle: 1997:39). Extensive settlement of the Blue Ridge begins in the early 1800's, after the more desirable lands in the Piedmont and Shenandoah Valley had been claimed. During this time the hollows on both sides of the ridge began to be settled while the uplands were used for cattle pasture (Crandall and Engle 1997; Horning 1999).

In 1926, the U.S. Congress authorized the establishment of the Shenandoah National Park in the Blue Ridge Mountains but did not provide funding to acquire land. In 1928, the first segment of the Appalachian Trail was constructed within the proposed park boundaries (Shenandoah National Park 1998a). Then, over a period of 10 years, private funds and monies from the Commonwealth of Virginia secured 176,429 acres of land and the National Park was established in 1935. As the property was purchased some people moved off their homesteads voluntarily. Others were reluctantly relocated outside the park area. In 1931 construction started on Skyline Drive as part of a drought relief measure. Beginning in 1933, the Civilian Conservation Corps (CCC) landscaped Skyline Drive, did additional work along the roadway, and developed most of the facilities needed by park visitors. Skyline Drive is now listed on the National Register as a cultural landscape.

After its creation, Shenandoah National Park was managed as a natural area and for recreation. During this time evidence of prior human occupation and land modification was removed or allowed to return to nature. As the Blue Ridge recovered, areas of the Park were considered for wilderness designation. In 1976, a portion of the National Park was designated as the Shenandoah Wilderness. In 1978, the Appalachian National Scenic Trail was added as a separate unit of the National Park System. This designation included the 101-mile section of the trail within the Park boundaries (Shenandoah National Park 1998b).

C. Reconnaissance Methodology and Results

The presence of significant cultural resources was identified early in the fire suppression effort. When the fire threatened a number of standing historic buildings in the designated Wilderness area, Corbin Cabin, a nearby cabin in the same hollow, and the Jenkins Cabin were successfully defended. During the fire, Jamie Bennett, Shenandoah National Park Archaeologist, served as archaeological resource advisor. She also supervised the Shenandoah N.P. archaeological field crew, consisting of Sandie Arnold and Ryan Kimberly. This crew surveyed all dozer and hand lines prior to fire control.

The Burned Area Emergency Rehabilitation (BAER) Team was requested to assist the Park and arrived in the area of November 12, 2000. Chuck James, BAER Archaeologist, began assessment of cultural resources that may have been affected by fire on November 13, 2000. Personal communication and coordination was primarily conducted with Shenandoah National Park employees Reed Engle and Jamie Bennett. Cultural resource data for this incident is based on a review of relevant literature and cultural resource site data provided by Shenandoah NP cultural resource personnel.

D. Findings

While the Shenandoah National Park maintains a collection of cultural resource literature specific to the Park and a file of sites that have been previously identified in its boundaries. Access to this material was problematic because it was spread between several offices and not catalogued or indexed. In addition, while a survey of a portion of the Shenandoah Fire Complex has been recently completed and site locations mapped, the site records and descriptive report have not yet been received. This eliminated the ability to determine if additional sites are present during the field review. The Park has recently acquired an archaeologist, and they are in the process of transferring site information to that program. The Park is also in the process of acquiring an archivist. As such, problems encountered in acquiring data are considered short-term results of positive program growth.

A search of Shenandoah National Park site files indicated there are 177 known or previously recorded archeological sites within the Shenandoah Fire Complex. Twenty sites are located within bulldozer or hand lines. The remainder of the sites is found on a variety of landforms throughout the fire area.

Portions of three days were spent in the field. During this time, a variety of site types were reviewed for their susceptibility to fire effects. No fire effects were observed, or are anticipated to have occurred at prehistoric sites because of the fires low burn severity and intensity. This is not the case at historic sites, however, where their wood component is subject to fire effects even in low intensity fire areas. A review of available records and preliminary documentation from the pending report indicates approximately 120 historic sites fall into this category.

IV. RECOMMENDATIONS

A. Management (specification related)

1. Assess areas of immediate impact from suppression and proposed rehabilitation activities. See Part F #1 C-1a: Cultural Resources Damage Assessment, Compliance and Rehabilitation (Suppression).

2. Assess fire effects on cultural resources in all areas of the burn, susceptible to accelerated erosion. See Part F #2 C-3: Cultural Landscape Damage Assessment, Compliance and Rehabilitation (Previously Documented Sites).

3. Initiate treatment of sites in immediate danger as a result of the fire, including physical manipulation of vegetation/debris, site stabilization through erosion control, and other preservation activities as appropriate. Sites that require immediate preservation treatment to protect them against accelerated erosion should be identified and treated. See Part F #2 C-3: Cultural Landscape Damage Assessment, Compliance and Rehabilitation (Previously Documented Sites).

B. Management (non-specifications related)

1. Initiate Section 106 compliance when affected sites are identified.

2, Identify sites that require increased law enforcement patrol due to easier access as a result of increased exposure from lack of vegetative cover. Patrols are paid by Agency Operating Funds.

V. CONSULTATIONS

Reed Engle: Shenandoah National Park, Branch Chief, Cultural Resources. Information on administration of Park, facilitation with key Park personnel, background information on cultural landscapes and sites, review of proposed damage assessment, consultation process at Shenandoah NP.

Jamie Bennett: Shenandoah National Park, Archeologist. Background information on prehistoric and historic resources, damage assessment plan, coordination of personnel needs and site visits.

Kara Metz, Staff, Virginia State Historic Preservation Office, Department of Historic Resources.

VI. REFERENCES

American Park Network 2000. *Shenandoah National Park*, 11th ed., American Park Network.

Crandall, Hugh and Reed Engle 1997 (revised ed.). *Shenandoah The Story Behind the Scenery*. KC Publications.

Horning, Audrey J. 1999. *Hogcamp Branch Survey: Shenandoah National Park, Central District, Big Meadows*, August 1998. The Colonial Williamsburg Foundation Department of Archaeological Research. Williamsburg.

Shenandoah National Park 1998a. *Backcountry and Wilderness Management Plan, Shenandoah National Park*, August 1998.

Shenandoah National Park 1998b. *Resource Management Plan, Shenandoah National Park*, September 1998.

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U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION TEAM

Shenandoah Fire Complex

SOIL AND WATERSHED RESOURCE ASSESSMENT

I. OBJECTIVES

- Assess overall watershed changes caused by the fire, particularly those that pose substantial threats to human life, property, and critical natural and cultural resources. This includes evaluating changes to soil conditions, hydrologic function, and watershed response to precipitation events.
- Identify the most critical soil and watershed areas and issues related to the Shenandoah Fire Complex based on increased flood potential and loss of soil resources and prescribe treatments to mitigate impacts and risks.
- Develop maps of burn severity and treatments, if necessary.
- Identify future monitoring needs.

II. ISSUES

- Threats to human life and property within and downstream of the Shenandoah Fire Complex.
- Threats to aquatic life from sedimentation and changes in water quality.
- Potential loss of soil productivity and increased erosion.

III. OBSERVATIONS

A. Background

Geology: The fires of the Shenandoah Fire Complex burned 24,222 acres in the Blue Ridge Mountains. Elevations of the burned areas range from approximately 840 to 3730 feet. The Blue Ridge Mountains lie within the Blue Ridge physiographic province, the narrow mountainous area between the low-lying Piedmont province to the east and the Valley and Ridge physiographic province to the west. The mountains and ridges are smooth and rounded except where occasional ledges or cliffs break through the forest cover. The valleys slope progressively more gently away from the mountains into broad, gently rolling lowlands with meandering streams and rivers.

The geologic strata underlying the burn area are the Old Rag Granite, Pedler Formation and the Catoctin Formation all from the Precambrian Period. The Old Rag Granite is a light-gray to nearly white, coarse-grained, porphyritic rock of granitic composition that is resistant to weathering and forms bold, extensive outcrops on several mountaintops. The Pedler Formation is a fine- to medium-grained granodiorite that may have a massive or layered appearance. The Catoctin Formation is a thick multilayered sequence of resistant volcanic and sedimentary rock that caps most of the higher mountains. The formation is characterized by a preponderance of metamorphosed basalt beds that were once ancient lava flows. Thin beds of metamorphosed sandstone, conglomerate, volcanic breccia, and tuff are interbedded with the metabasalt. Within the volcanic sequence, the ancient lava flows are the most resistant beds and form topographic benches.

Soils: Soils within the Shenandoah Fire Complex area have been mapped by the Natural Resources Conservation Service (formerly the Soil Conservation Service). Table 1 contains a list of the dominant

soils. A complete list of soils and detailed soil descriptions can be found in the soil survey reports for Madison, Page, and Rappahannock Counties.

Table 1. Major soil map units occurring within the Shenandoah Fire Complex.

Soil Map Unit	Soil Name
Soils of Madison County	
Cu	Colluvial land, extremely stony
PoC	Porters very stony loam, 7 to 15% slopes
PoD	Porters very stony loam, 15 to 25% slopes
PoF	Porters very stony loam, 25 to 50% slopes
Rn	Rock land, acidic
RtD	Rock land, Myersville and Catoctin materials, moderately steep
RtE	Rock land, Myersville and Catoctin materials, steep
TuC	Tusquitee stony loam, 7 to 15% slopes
TuD	Tusquitee stony loam, 15 to 25% slopes
Soils of Page County	
38D	Peaks-Edneytown complex, 15 to 35% slopes, extremely stony
38E	Peaks-Edneytown complex, 35 to 55% slopes, extremely stony
38F	Peaks-Edneytown complex, 55 to 70% slopes, extremely stony
Soils of Rappahannock County	
PoD	Porters stony loam, moderately steep phase
PoE	Porters stony loam, steep phase
RkE	Rock land, acidic, steep phase
Ve	Very rocky land

Most of the soils are steep and rocky. Of the common map units, six (Cu, Rn, Rtd, Rte, RkE,Ve) are dominated by rockland or extremely stony colluvium. The Peaks-Edneytown complexes (38D, 38E, 38 F) have an extremely stony surface horizon. The Porters soils of Madison County (PoC, PoD, PoF) have a very stony surface horizon while the Tusquitee and Porters soils of Rappahannock County (TuC, TuD, PoD, PoE) have a stony surface. The large amount of rock fragments lessens the erosion potential for most soils.

Climate: The climate is dominated by winter storms that track from the west and north, and moist, tropical air masses from the Gulf of Mexico and southwest Atlantic Ocean during the remainder of the year. During the winter, large-scale, low-pressure systems predominate, producing storms with wide aerial extent, low intensity, and long duration. In contrast, summer precipitation often occurs as local showers and thunderstorms with local aerial distribution, high intensity, and short duration.

Precipitation amounts are fairly evenly distributed throughout the year. Normal annual precipitation at Big Meadows (elevation 3,535) is 50 to 55 inches and average monthly precipitation ranges from a minimum of about 3 inches in February to about 5 inches in August. Topography affects the distribution of precipitation since the cooling of air masses as they are mechanically lifted over a mountain barrier may result in orographic precipitation. During the passage of frontal systems, the orographic effect often produces intensified precipitation at higher elevations. Occasionally, precipitation will be limited to higher elevations, leaving the foothills and upslope areas dry. Nonfrontal storms, such as thundershowers, also may be triggered or intensified as they are lifted over the mountains. The net effect of the Blue Ridge Mountains is to increase precipitation by 4 to 5 inches per year for every 1,000-foot increase in elevation.

Mean annual air temperatures increase with decreasing elevations. From 1962-71 the annual temperature at Shenandoah National Park Headquarters (elevation 1,200 feet averaged 52ºF compared with 46ºF at Big Meadows (elevation 3,535 feet) (U.S.G.S., 1987). During the winter months, storms frequently drop rain in the foothills and snow at higher elevations because of this temperature gradient.

Hydrology: The burn area lies within the Chesapeake Bay watershed and contains perennial and intermittent streams. Several streams provide native fish habitat. Water flows from the Shenandoah National Park (Park) to private land.

Chronic and episodic acidification from air pollution has adversely impacted the park's streams, soils and fish, particularly in watersheds dominated by bedrock types with low acid neutralizing capacity. Brook trout and black nose dace have suffered measurable impacts at the community, population, and individual levels. Soils in sensitive watersheds are threatened by irretrievable loss of sulfate adsorption capacity. Eleven watersheds are monitored within the Park to document long-term acidification effects on aquatic resources.

B. Reconnaissance Methodology

The purpose of a burned area assessment is to determine if the fire caused emergency watershed conditions. If an emergency is not found, the assessment stops. If emergency watershed conditions are found, then the magnitude and scope of the emergency is mapped and described, values at risk and resources to be protected are identified, and treatment prescriptions are developed to protect values at risk. Emergency watershed conditions include both hydrologic and soil factors; typically potential for flash floods and debris flows and deterioraion of soil condition, particularly loss of soil cover, leading to a decline in soil productivity. Table 2 describes terms commonly used in assessing soils and watersheds that have been burned.

Table 2: Definitions of terms commonly used in soil and watershed burned area assessments.

Term	Definition
Fire Intensity	Based on temperature, flame length, heat of combustion and total amount and size of fuel consumed. Accounts for convective heat rising into the atmosphere and fire effects to the overstory.
Fire Severity	Based on temperature, moisture content of duff and fuels lying on the ground, heat of combustion of conductive and radiant heat that goes down into the soil, affecting soil characteristics.
Burn Severity	A relative measure of the degree of change in a watershed that relates to the severity of the effects of the fire on watershed conditions. Burn severity is delineated on topographic maps as polygons. Classes of burn severity are high, moderate, low, and unburned.
Watershed Response	A qualitative degree and/or modeled measure of how a watershed will respond to precipitation. Parameters include pre-existing soil moisture; amount and duration of rainfall; lag time between initation of storm and peak flow runoff; and peak flow discharge and sediment yield. Changes in the characteristics of a watershed brought about by a fire increase the efficiency with which a watershed yields runoff. Burned watersheds yield more water faster.

Aerial reconnaissance surveys and field evaluations were conducted to identify the spatial distribution and extent of the fire severity and resulting burn severity and soil conditions. Fire evaluations included, but were not limited to:

- Edaphic fire effects;
- Aerial extent and strength of hydrophobic soil conditions;
- Mapping burn severity;

- Current channel and culvert capabilities;
- Threats to human life and property from storm or mud flow and debris.

Burn Severity: Burn severity is not the same concept as fire intensity and fire severity as recognized by fire behavior specialists. Fire intensity and fire severity relate to fire effects on overstory and understory vegetation, respectively, while burn severity relates specifically to effects of the fire on soil conditions and hydrologic function (e.g., amount of surface litter, erodibility, infiltration rate, runoff response). Although burn severity is not primarily a reflection of effects of fire to vegetation, vegetative conditions and pre-fire vegetation density are among indicators used to assess burn severity.

Site indicators used to evaluate and map burn severity include soil hydrophobicity (water repellency), ash depth and color (fire severity), size of residual fuels (fire intensity), soil texture and structure, and post-fire effective ground cover. These criteria indicate fire residence time, depth of litter layer consumed, radiant heat throughout the litter layer and ease of detachability of the surface soil. Using these indicators, burned areas are mapped into three relative burn severity categories. These include high, moderate, and low.

In some cases there may be complete consumption of vegetation by fire, with little effect on soil and watershed function. In general, the denser the pre-fire vegetation and the longer the residence time, the more severe the effects of the fire are on soil hydrologic function. For example, deep ash after a fire usually indicates a deeper litter layer prior to the fire, which generally supports longer residence times.

Increased residence times promote the formation of water repellent layers at or near the soil surface, and loss of soil structural stability. The results are increased runoff and soil particle detachment by water and transport off-site (erosion). The presence of white ash indicates a hotter fire and more complete consumption of organic matter. Powdery ash without identifiable remnants of twigs and leaf litter also indicates more complete consumption. Generally there is a close correlation between soil properties and the amount of heat experienced by the soil as well as the residence time of the heat in contact with the soil.

The burn severity map becomes a basis to predict the hydrologic response of soil to the fire and the rate of natural revegetation of the site following the fire. It is important to note that burn severity map units are usually mapped at no less than 40 acres in size and may include areas of other burn severity, which are too small to segregate. Small areas of different burn severity can therefore be present in each map unit.

Soil Conditions: Edaphic fire effects were evaluated for several parameters that affect soil conditions. These parameters are hydrophobicity, changes in vegetative ground cover, and soil structure, and suceptibility to water erosion. Hydrophobicity was evaluated by observing the depth and thickness of a water repellent horizon in surface soils where it exists, and duration of a water bead on this surface. Changes in vegetative ground cover as affected by the fire were noted and compared to pre-fire conditions. Soils subject to water erosion were examined in the field to determine if there is an increased risk of erosion. Soil survey maps and air photos were used to assist in making predictions of areas with the greatest risk of water erosion.

Watershed Response: On-the-ground field observations and aerial reconnaissance within and downstream of the burn areas were conducted to determine the potential for high runoff response. Channel morphology related to the transport and deposition processes were noted, along with channel crossings and stream outlets. Observations included condition of riparian vegetation and the volume of sediment stored in channels and on slopes that could be mobilized. Burn severity and changes in soil infiltration were also considered.

C. Findings

Burn Severity: The Shenandoah Fire Complex consumed mostly ground fuels and leaf litter. In most cases, the leaf litter was not completely consumed. Table 3 is a summary of burn severity acres. A burn severity map is included in Appendix III.

Table 3. Summary of burn severity acres and percentages found on the Shenandoah Fire Complex.

Burn Severity	Acres	Percent
High	0	0
Moderate	0	0
Low	24,222	100
Total	24,222	100

Included in the low burn severity acres are very small areas of moderate burn severity and unburned islands that are too small to map. Some areas had slightly more intense fire behavior but the fire did not have a significant impact on soils. In most areas with **low burn severity**, the leaf litter was charred but not completely consumed. However, the effective ground cover in these areas has been reduced. The surface soil contains a dense network of fine roots that was not damaged by the fire. Moderate to strong water repellency was found in some areas but is very spotty and covers only about 15 to 20% of the area. A few areas with low burn severity do have strong water repellency but these areas had strong water repellency prior to the fire. These areas have an organic surface layer several inches thick with a very dense network of fine roots and are very resistant to erosion. Overall, the ability of water to infiltrate soils in the low burn severity areas has not been greatly reduced.

Soil Condition: Most of the soils have lost some of the leaf litter cover that normally protects them from raindrop impact, however, much of the litter was not completely removed but only charred and will offer some protection from erosion. Nearly all soils have a dense network of fine roots near the surface that will reduce erosion. In addition, most of the soils have a large amount of rock fragments on the surface that will offer additional protection from erosion. All of the above factors combine to create a situation where an increase in soil erosion is possible but a large increase in erosion is not expected. Loss of soil nutrients and topsoil should not be excessive.

Watershed Response: None of the burned area is expected to have a high watershed response as a result of changes to the watershed caused by the fire. However, because of reduced ground cover, a small increase in runoff and erosion is possible in some areas. Debris flows and flooding are not expected to occur as a result of the fire. Therefore, watershed impacts to private property downstream of the burn areas as a result of the fire are not expected.

Values at Risk and Resources to be Protected: Because of the low burn severity, threats to human life and property within and downstream of the burned areas are expected to be minimal. Because no significant increase in erosion is expected, threats to aquatic life from sedimentation and changes in water quality are expected to be minimal. No watershed treatments are recommended other then rehabilitating sites impacted by fire suppression activities.

IV. RECOMMENDATIONS

A. Management (specification related)

1. Construct Rolling Dips and Seed Dozer Lines

Rehabilitate dozer lines along the powerline near Thronton Gap by constructing rolling dips. This rehabilitation will reduce erosion from the dozer lines. The dozer lines will also be seeded with native grass to control erosion and reduce the spread of non-indigenous invasive plants. See Vegetation Resources Assessment Section for a discussion of the seeding specification.

See Part F Specification: F-1 Rehabilitate Dozer Lines and W-1b Stabilization of Dozer Line

B. Monitoring (specification related)

No recommendations.

C. Management (non-specification related)

No recommendations.

D. Monitoring (non specification related)

No recommendations.

V. CONSULTATIONS

Shane Spitzer, Environmental Protection Specialist, Shenandoah National Park (540) 999 3434
Ben Morgan, Geologist, U.S. Geological Survey (703) 648-6927

VI. REFERENCES

Gathright, T.M., II, 1976. Geology of the Shenandoah National Park, Virginia. Virginia Division of Mineral Resources Bulletin 86, Charlottesville, Virginia.

Shenandoah National Park, 1998. Resource Management Plan.

U.S.D.A.-F.S., 1995. FSH 2509.13 – Burned-Area Emergency Rehabilitation Handbook.

U.S.D.A.-N.R.C.S., 1995. Classification and Correlation of the Soils of Page County, Virginia.

U.S.D.A.-S.C.S., 1975. Soil Survey of Madison County, Virginia.

U.S.D.A.-S.C.S., 1961. Soil Survey of Rappahannock County, Virginia.

U.S.G.S., 1987. Hydrologic Conditions and Trends in Shenandoah National Park, Virginia, 1983-84. Water-Resources Investigations Report 87-4131.

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U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION TEAM

Shenandoah Complex Fire

THREATENED AND ENDANGERED PLANT RESOURCE ASSESSMENT

I. ISSUES

- Determine impacts of burning and fire suppression activities to eight state-listed rare plant species reported from within the fire perimeter.

II. OBSERVATIONS

A. Background

Occurrence data were found for eight state-listed rare plant species within the fire area. These species were: American fly honeysuckle (*Lonicera canadensis*, G5, S3); round-leaf pyrola (*Pyrola eliptica*, G5, S2); mountain sandwort (*Minuartia groenlandica*, G5, S1); quaking aspen (*Populus tremuloides*, G5, S2); Appalachian fir clubmoss (*Huperzia appalachiana*, G4/G5, S2); rand's goldenrod (*Solidago randii*, G4, S2S3); bristly sarsaparilla (*Aralia hispida*, G5, S2); and round-leaf dogwood (*Cornus rugosa*). All of these species are more common northward, but have very few occurrences in Virginia. The fire perimeter encompassed the park's only population of *Minuartia groenlandica* and *Populus tremuloides*.

B. Reconnaissance Methodology and Results

On November 13, 2000 information detailing the number of occurrences of state and federally listed rare plant species within the fire perimeter was relayed to the BAER Team Vegetation Specialist by the park Botanist. Additional information on all rare plants occurring within the three counties represented in the burn perimeter was also given to the BAER Team Vegetation Specialist. This information was acquired from park files and publications by the Virginia Department of Natural Heritage. On November 14 and 15, 2000 the BAER Team Vegetation specialist initiated site visits to examine some of the known rare plant population locations within the burn perimeter. Sites were visited on Old Rag mountain and in the upper Hazel river area.

C. Findings

There are no federally listed rare plant species within the fire area. The following table shows all state and federally listed species that occur within the three counties affected by the fire, but are not known to be in the fire area:

Table 1. State and federally listed rare plant species occurring in Page, Rapahanock, and Madison Counties, Virginia. Federally listed species are indicated by an asterisk.

Abies balsamea	*Cuscuta polygonorum*	*Penstemon hirsutus*
Alnus incana spp. rugosa	*Cuscuta rostrata*	*Platanthera grandiflora*
Arabis hirsuta var. adpressipilis	*Cyprus houghtonii*	*Poa paludigena*
Arabis serotina *	*Eleocharis compressa*	*Poa palustris*
Arctostaphylos uva-ursi	*Epilobium leptophyllum*	*Pyrola chlorantha*
Aster radula	*Eupatorium maculatum var. maculatum*	*Quercus prinoides*
Betula cordifolia	*Euphorbia purpurea*	*Rhamnus alnifolia*
Betula populifolia	*Geranium robertianum*	*Rubus idaeus spp. strigosus*
Botrychium multifidum	*Geum aleppicum*	*Sagittaria rigida*
Botrychium simplex	*Gnaphalium uliginosum*	*Sanguisorba canadensis*
Bromus ciliatus	*Isotria medeoloides* *	*Sibbaldiopsis tridentata*
Carex buxbaumii	*Juncus trifidus*	*Solidago rupestris*
Carex conoidea	*Liparis loeselii*	*Sporobolus neglectus*
Carex polymorpha	*Menyanthues trifoliata*	*Streptopus amplexifolius*
Cheilanthes eatonii	*Mimulus moschatus*	*Trichostema setaceum*
Conioselinum chinense	*Monotropa odorata*	*Trillium cernuum*
Crataegus pruinosa	*Muhlenbergia glomerata*	*Trisetum spicatum*
Crataegus succulenta	*Osmunda cinnamomea var. glandulosa*	*Vaccinium myrtilloides*
Cuscuta coryli	*Paxistima canbyi*	

Eight state-listed rare plants were found within the burn area. Observations indicated that the fire burned a mosaic pattern in the vicinity of some of the high-elevation rare plant populations on Old Rag mountain, and one species was not burned. Additional monitoring is needed to determine how many of the remaining seven species were burned.

Aralia hispida- occurs in mid- to high-elevation rocky, open habitats in Virginia and is reported from one area within the burn perimeter. This species is known to be dependent on periodic fire or other disturbance and is thought to be rare in Virginia due to fire suppression.

Cornus rugosa- occurs on acid soils and is known from only three sites in Virginia. A population is reported from one area within the burn perimeter. All species within this genus are currently threatened by the dogwood anthracnose (*Discula destructiva*). Cornus rugosa is not fire tolerant but may re-sprout from the roots.

Huperzia appalachiana-occurs on rocky exposures at mid- to high elevation areas in the Blue Ridge Mountains. Fewer than twelve locations are known in Virginia. Two of these locations were within the burn perimeter. Above-ground portions are easily killed by fire, but deep rhizomes may survive a light surface burn. The two occurrences in SNP are described as being on sheltered outcrops. Monitoring will determine if the outcrops protected the populations from the fire. Rehabilitation efforts will be considered if populations are burned and unable to recover naturally.

Lonicera canadensis- is a watchlisted species in Virginia. The two populations within the fire perimeter appear to have burned completely. Little information is available on the fire tolerance of this species. However, the plants were growing in moist soil and most likely did not sustain any root damage. Monitoring will be done for any re-sprouting from the base.

Minuartia groenlandica- grows in a low mat on exposed rocky summits. This species is known from only three locations in Virginia. One location was within the fire perimeter but was not burned.

Populus tremuloides- occurs at a few scattered locations in Virginia and is known from one place within the burn perimeter. Trees are readily killed by fire, but sprout back vigorously from the roots. All trees within the SNP population appeared to have been girdled by the fire.

Pyrola eliptica- is reported from one location within the burn area. The species is found in dry upland woods and has fewer than ten locations in Virginia. No information is available on the fire tolerance of this species. However, it is found in a forest type that periodically burns, indicating that it is probably able to re-grow from root or seed after fire.

Solidago randii- occurs at fewer than 20 sites in Virginia. One site was within the burn area. This species is typically found rooted in cracks on exposed outcrops and may not have been burned. No information is available on the fire response of this species, but other species of goldenrod have been shown to maintain a similar coverage after a light to moderate burn.

III. RECOMMENDATIONS

A. Monitoring (specification related)

N-1a, T & E Plant Assessment

Assess the areas known to contain sensitive/rare plants to determine the present status and potential response to the Shenandoah Fire Complex. Plant species should be assessed and post-fire effects should be recorded on seven previously documented state rare plant species found within the fire perimeter: American fly honeysuckle (*Lonicera canadensis*, G5, S3); round-leaf pyrola (*Pyrola elliptica*, G5, S2); quaking aspen (*Populus tremuloides*, G5, S2); Appalachian fir clubmoss (*Huperzia appalachiana*, G4/G5, S2); rand's goldenrod (*Solidago randii*, G4, S2S3); bristly sarsaparilla (*Aralia hispida*, G5, S2); and round-leaf dogwood (*Cornus rugosa*). Some of these species may respond positively to fire. These species should be relocated in the field and information about specific plants and associated plant communities should be documented. Plants should be located and mapped with GPS and the data entered into the park's GIS. Monitoring protocols, if not presently in place, should be developed. If monitoring indicates negative fire effects on these plant populations, develop mitigation strategies in consultation with the Virginia Department of Natural Heritage. Follow-up treatments could consist of collecting and increasing seed (if located in other areas throughout the park), and propagation of plants to be returned to its critical habitat. If mitigation or further monitoring is needed develop a supplemental request for funding.

B. Management (non-specification related)

Field reconnaissance revealed heavy impact by hikers to the summit of Old Rag Mountain. Trampling has killed vegetation resulting in severe soil erosion, both of which have greatly degraded the summit's sensitive rare plant community. Monitoring hiker impacts to the remaining glade communities near the summit is essential. Increased education efforts and limiting hiker access to the remaining glades may help prevent further degradation and subsequent loss of these rare plant communities.

IV. CONSULTATIONS

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V. REFERENCES

Fire Effects Information System. 1999. Fire Effects Information System Online. www.fs.fed.us/database/feis/plants/ (viewed November 17, 2000).

Gleason, H.A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, Second Edition. New York Botanical Garden. Bronx, New York.

Heffernan, K.E. 1999. Rare Natural Communities Management Guidelines, Rare Plant Summary Information, and Rare Plant Species Matrix for Shenandoah National Park, Virginia. Natural Heritage Technical Report #99-12. Department of Conservation and Recreation Division of Natural Heritage, Richmond, Virginia.

Killeffer, S.E. 2000. Natural Heritage Resources of Virginia: Rare Vascular Plants. Natural Heritage Technical Report #00-06. Department of Conservation and Recreation Division of Natural Heritage, Richmond, Virginia. Unpublished report. January 2000 28 pages plus appendices.

Ludwig, J.C., G.P. Fleming, C.A. Pague, and T.J. Rawinski. 1993. A Natural Heritage Inventory of Mid-Atlantic Region National Parks in Virginia: Shenandoah National Park. Natural Heritage Technical Report #93-5. Department of Conservation and Recreation Division of Natural Heritage, Richmond, Virginia.

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U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION TEAM

Shenandoah Fire Complex

VEGETATION RESOURCE ASSESSMENT

I. ISSUES

- Evaluate short and long-term impacts to plant communities and vegetative resources within the Shenandoah Fire Complex area.
- Evaluate and assess fire and suppression impacts to vegetative resources and identify values at risk associated with vegetative losses.
- Determine rehabilitation and monitoring needs supported by specifications to aid in vegetation recovery and soil stabilization.
- Provide management recommendations to assist with protection of site productivity and watershed stability, and reduce impacts from non-indigenous invasive plant species; emphasizing management strategies which provide for the natural regeneration and recovery of impacted areas.
- Develop monitoring strategies to assess revegetation and treatment results.

II. OBSERVATIONS

This report identifies and addresses known and potential impacts to vegetative resources within the Shenandoah Fire Complex on the Shenandoah National Park (SNP), Virginia.

The burned area consists of approximately 24,222 gross acres of mid-Atlantic region, Appalachian hardwood forests. Approximately 1,113 acres are private lands, the remaining 23,109 acres are entirely within SNP. Federal Wilderness designation status composes 14,829 acres of the total. Vegetative resources provide forage and cover for a variety of wildlife species, aesthetic values, watershed stability, and are biologically diverse examples of Appalachian plant communities.

Findings and recommendations contained within this assessment are based upon information obtained from personal interviews with SNP staff, BAER team specialists, literature research, and field reviews of the fire area.

Reconnaissance of impacted areas was conducted utilizing aerial and ground survey methods. This assessment will attempt to capture the concerns expressed by the Shenandoah National Park resource staff for the future management of these lands; will detail the known changes to vegetative resources; will discuss revegetation processes and future monitoring criteria; and will outline management considerations for recovery/maintenance of the vegetative resources.

A. Background

The Pinnacle and Old Rag Fires were ignited on October 29 and 30 (respectively) as probable human caused incidents. The 25 acre Rapidan Road Fire burned during the same time period. Fueled by dry surface litter and rolling to steep topography, erratic winds quickly pushed the fire which escaped initial attack response and burned uncontained until control on November 13, 2000.

Vegetative resources were impacted by this fire to some degree, depending upon fire behavior and local forest conditions. As detailed later in this report, fire impacts ranged from none to partial alteration of plant communities within many watersheds. Vegetative resources for wildlife, were partially impacted for the short-term. No vegetative resources sustained long-term losses of productive capacity, nor were any site degrading impacts observed or expected, proving that reasonable mitigation measures are employed during the post-fire recovery period (3+ years).

Primary plant associations within and affected by the fire are detailed below. The terrain varies from long fairly flat hollows to sloping hillsides with moderate to steep slopes and rock outcrops. The aspects of the hillsides dictate the variability of the vegetative communities as well as the soil textures and depths. The annual precipitation ranges from 35-45 inches per year.

The pre-fire vegetation types documented by the SNP Geographical Information system within the fire area are as follows:

Pre-fire Vegetation on the Shenandoah Fire Complex Area.

Vegetation Cover Type	Ecological Site	Acres	Proportion
Chestnut oak	Ridgetop / upper slopes	10,399	45 %
Yellow poplar	Bottoms / lower slopes	7,626	33 %
Cove hardwoods	Lower slopes	2,773	12 %
Red oak	Mid-slopes	1,387	6 %
Pine	Variable (early-successional)	347	1.5 %
Hemlock	North slopes / cool drainages	231	1 %
Black locust	Variable (early-successional)	231	1 %
Rock cliff / outcrops	Variable	69	0.3 %
Other non-forest	Variable	46	0.2 %
	Total Acres	23, 109	

Forest Cover Type Descriptions :

The vegetation types represented in the Shenandoah Fire Complex of October/November 2000 are based on the Forest Cover Types of the United States and Canada (Eyre 1980). Descriptions of each cover types are as follows:

Chestnut Oak Forest

The chestnut oak forest cover type generally occurs on the dryer and poorer sites in the park. The most common sites have shallow soils where rock outcrops are common, and are associated with steep slopes, ridge tops, and spur ridges with southern or western aspects. Available soil moisture is the limiting factor for growth and production on most of the sites occupied by chestnut oak and associated species. Common species associated with chestnut oak (*Quercus prinus*) include scarlet oak (*Quercus coccinia*), hickory species (*Carya* spp.), black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), red maple (*Acer rubrum*), black locust (*Robinia pseudoacacia*), pitch pine (*Pinus rigida*), and Virginia pine (*Pinus virginiana*). On the better quality sites within the type, basswood (*Tilia americana*), white ash (*Fraxinus americana*), and eastern white pine (*Pinus strobus*) are often found. In general the stands range from 40-150

years old and are even-aged or two-aged; however, in some cases stands with an irregular uneven-aged structure occur. Common understory species include red maple, mountain laurel (*Kalmia latifolia*), flowering dogwood (*Cornus florida*), bear oak (*Quercus ilicifolia*), striped maple (*Acer pensylvanicum*), sassafras (*Sassafras albidum*), grapes (*Vitis* spp*.)*, and blueberries (*Vaccinium* spp.).

Historically, the chestnut oak cover type has been subjected to periodic wildfire and has been logged on one or more occasions. More recently, large areas of chestnut oak died after repeated defoliation during a severe gypsy moth (*Lymantria dispar*) infestation (1986-1995). Areas that were defoliated in two consecutive years appear to have the worst mortality (see Appendix 3, Vegetation Monitoring Map). The Shenandoah Fire Complex burned more intensely in gypsy moth kill areas and appears to have top killed most woody regeneration. For this reason, woody regeneration and non-indigenous species will be monitored in these areas to assess recovery and possible habitat degradation.

Most of the species associated with the chestnut oak types are prolific sprouters, and many of the stems have developed from clumps of stump sprouts following a disturbance. Most canopy species within the cover type are known to be fire tolerant when mature, however many of the shade tolerant understory species and saplings are readily killed by fire.

Yellow Poplar Forest

The yellow-poplar forest cover type is a highly productive combination of hardwood species dominated by yellow-poplar (*Liriodendron tulipifera*), with northern red oak, sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), basswood, black locust, black birch (*Betula lenta*), white oak (*Quercus alba*), white ash, red maple, eastern hemlock (*Tsuga canadensis*), and eastern white pine being common associates. The sites dominated by yellow-poplar and associated subtypes represent the best sites in SNP. The sites are generally cool, moist, with good moisture conditions throughout the growing season, and are situated on moderate to deep, fertile and well-drained soils. The type occurs to a limited degree on gently sloping, lower slope positions, and protected coves of southern and western aspects. On northern and eastern aspects it occurs extensively on moderate to steep slopes of lower and mid-slope positions and in coves.

Yellow-poplar is a shade intolerant species and therefore most often exhibits an even-aged or two-aged stand structure. Most stands in the SNP are estimated to be under 100 years old; however, individual stems on many sites are well over 100 years of age. Common understory species include flowering dogwood, spicebush, red maple, striped maple, witch hazel (*Hamemalis virginiana*), downy serviceberry (*Amelanchier arborea*), sassafras, and grapes. On many sites, as a result of dense overstory canopy and high basal areas, the understory is often sparse and composed of only the more shade tolerant species.

Red Oak Forest

The red oak forest cover type is generally found on cool sites of medium site quality, with good moisture conditions throughout most of the growing season. On southern and western aspects the northern red oak type occurs on the gently sloping, lower slope positions, while on northern and eastern aspects the type occurs on moderate to steep slopes of mid- and upper-slope positions. The northern red oak type is closely related to the cove hardwood type in terms of the micro-climatic conditions that prevail. Common associated main canopy species include white oak, black oak, hickory, white ash, chestnut oak, yellow-poplar, and black birch. Understory species include witch hazel, red maple, flowering dogwood, mountain laurel, striped maple, Azaleas (*Azalea* spp.), blackberries, blueberries (*Rubus* spp.), and viburnums (*Viburnum spp*.). Seedlings of overstory species are also found. The stands in SNP range in age from less than 40

to not much over 100 years. In general, an even-aged stand structure would be the most prevalent; however, two-aged and irregular uneven-aged stands are common.

Disturbance of the red oak forest type has been related to the loss of American chestnut and periodic logging prior to 1935, and to the gypsy moth infestation from 1986-1995. Fire severity in this cover type is relatively low compared to that which can occur in the more exposed chestnut oak cover type.

Cove Hardwood Forest

The cove hardwood type is composed mainly of northern red oak, white ash, and basswood, and is similar to the northern red oak type in terms of species. The type is differentiated on the basis of a cove being a unique landform composed of the low slopes and floor of a deep well sheltered stream drainage. While the species in cover hardwood forest may overlap with those in other cover types, the rate of vegetation change is likely to be more rapid, and the reasons for change are probably different from those found on ridges and associated side slopes. Because of the protected nature of a cove, the damage from wind, ice, and wildfire are thought to be significantly less than that found on adjacent broad sideslopes. The higher site quality, coupled with the sheltered cove effect, has probably been a major factor in explaining the increased number of species being present on the cove sites when compared to the northern red oak type. The higher number of species and the more diverse silvical characteristics of these species are likely to result in a more rapid rate and different direction of successional change when compared to closely related types. The stand structure of cove hardwoods tends to be irregular uneven-aged. Most of the cove hardwood stands range from 40 to 100 years old. Common associated species include yellow-poplar on the better sites; red maple, black birch, hickory spp, and eastern hemlock on average sites; chestnut oak on the poorest sites; and black locust on severely disturbed sites. Dominant understory species include striped maple, witch hazel, spicebush (*Lindera benzoin*), flowering dogwood, grapes, blackberries, and black cherry (*Prunus serotina*).

PINE FOREST

Pine forests are found in dry areas characterized by shallow, sandy, and shaley soils associated with ridges and steep side slopes on southern and western aspects. The Virginia pine dominates the higher quality pine sites, whereas pitch and table mountain pine are found on the poorer pine sites. Pitch pine and table mountain pine (*Pinus pungens*) are fire dependant species forming the climax community for poor sites. The origin of the Virginia pine type is not as closely tied to wildfire as is the pitch pine type. Intensive forest harvesting, and the abandonment of fields and pastures are common sites for Virginia pine invasion. Virginia pine is more likely to occur at lower elevations within SNP than pitch pine. Virginia pine is an early secondary succession species and is seldom a subclimax type. On the better sites the pitch pine type is subclimax, giving way to more tolerant hardwoods.

The common associated overstory species in pine forests include chestnut oak, scarlet oak, black oak, red oak, white oak, red maple, black locust, blackgum (*Nyssa sylvatica*), and Virginia pine. Common understory species include mountain laurel, bear oak, sassafras, black gum, blueberries, and red maple. Areas dominated by pitch pine are usually found at higher elevations than those occupied by Virginia pine. Pine species seldom exceed 70 - 100 years of age, with the pine starting to drop out of the stands between 50 and 70 years, depending on site quality.

BLACK LOCUST FOREST

The black locust forest cover type develops on a wide range of sites following abandonment of fields and pastures and following wildfires or other severe disturbances. Black locust is a pioneer species and usually develops as nearly pure even-aged stands during the earliest stages of a secondary succession. Invasion by other hardwoods takes only a few years. Normally the type

is short lived, perhaps 40 - 60 years, and succession to associated hardwood types occurs relatively rapidly. Because of the wide range of sites on which the type occurs, associated species could include almost any species native to SNP. The most common associated species include red maple, yellow-poplar, hickory, black cherry, white ash, and various oak species. On the very best sites, scattered individual trees will be found in the main canopy of more shade tolerant species. Understory species are quite variable; however, the most common include flowering dogwood, red maple, spice bush, black cherry, blackberry, Apple (*Malus* spp.), and grapes.

In SNP the black locust type is not relegated to any particular topographic or specific site condition. Its presence is associated with those areas previously classified as open land or grassland and areas that have been subjected to severe disturbances.

EASTERN HEMLOCK FOREST

Eastern hemlock forest covers the least amount of area within SNP yet it is very important ecologically. Historically, the abundance and distribution of eastern hemlock has been controlled to a large degree by the periodic occurrence of wildfire. Hemlock is thin-barked and shallow-rooted; therefore, seedlings and saplings are very susceptible to damage and mortality from fire. Older (50 years and older) hemlock occurs mostly in protected cove sites on moist, cool northern, and eastern aspects. At present, hemlock found outside of the coves is relegated to the subcanopy.

The eastern hemlock type occurs on sites similar to those occupied by the northern red oak type and the cove hardwood type. Common associated species include northern red oak, basswood, yellow birch (*Betula alleghaniensis*), yellow-poplar, eastern white pine, sugar maple, and American beech. Due to the dense main canopy, hemlock understory is often sparse, containing only the most shade tolerant species. Common understory species include hemlock seedlings and saplings, witch hazel, striped maple, mountain maple, sugar maple, blackgum, and *Viburnum spp*. Most hemlock stands in SNP are 40 years or older. Stand structure is variable, but uneven-aged stands are probably the most common. Stands throughout SNP are currently in decline due to impacts from the Hemlock Wooly Aphid (*Adelgis tsuga*).

Non-Indigenous Invasive Plants

Pre-disturbance distribution of these plants was limited to isolated occurrence, due to an active monitoring and control program at SNP. The following species were detected during field reconnaissance:

- Oriental bittersweet (*Celastrus orbiculatus*)
- Japanese honeysuckle (*Lonicera japonica*)
- Mullein (*Verbascum* spp.)
- Princess tree (*Paulownia tomentosa*)
- Tree of Heaven (*Ailanthus altissima*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Spotted knapweed (*Centaurea maculosa*)
- Gill-over-the-ground (*Glechoma hederaceae*)
- Garlic mustard (*Alliaria petiolata)*
- Japanese knotweed *(Polygonum cuspidatum)*

B. Reconnaissance Methodology and Results

On November 13, 2000, the BAER Team Vegetation Specialist met with SNP staff to obtain baseline information pertaining to known impacts and information related to vegetation resources. Upon consultation with local staff, and after reviewing the burned areas within the fire perimeter, it has been determined that some direct fire impacts have occurred to each of the plant communities within the fire area.

Aerial reconnaissance of the burned area was conducted on November 13 and 15 by BAER Team members. Burn intensity within the fire was primarily observed to be low with some very small areas of moderate burn severity. The fire burned in a continuous fashion throughout much of the fire, but small mosaic burned areas were also observed. Private lands were also surveyed from the air. All of these lands are located in hollow bottoms or on lower slopes. Trails and roadways within the primary use areas were surveyed for hazard trees by walking through the area and evaluating degree of hazard, using the NPS hazard tree rating system.

Field reconnaissance of the fire was conducted by the BAER vegetation specialist and local resource advisors from SNP on November 14 and 15. Each plant association type was inspected to determine vegetative losses, effectiveness of suppression-related rehabilitation efforts, recovery potentials, and long-term rehabilitation needs. During the field inventories, observations were made of fire impacts to organic duff layers and live crown tissue on grass and shrub species. Observations were likewise made of adjacent areas outside of the fire for comparative purposes. Reconnaissance also included examination of areas affected by previous gypsy moth disturbance adjacent to the fire, to determine pre-fire condition of some of the areas impacted by fire. Particular efforts were made to determine the species composition of tree regeneration within the gypsy moth disturbed areas. Considerable efforts were made to examine areas of non-indigenous, invasive plant populations within or adjacent to the fire.

C. Findings

Generally, fire behavior on this incident can be classified as a creeping ground fire, with minimal scorch to overstory vegetation. However, wind events altered behavior in various locations and higher levels of scorch or even entire top-killing of vegetation occurred in places. Due to variable fire behavior, fuel conditions, topography, weather and suppression tactics during the incident, varying amounts of vegetative cover were affected by the Shenandoah Fire Complex.

Vegetation resources were directly impacted by fire effects and suppression tactics used to control the fire. Documented impacts to vegetation resulted from:

a. Impacts from construction of dozerline and handline adjacent to existing structures, roads, and on previously undisturbed sites.

b. Reduction of fuels and vegetation ahead of the fire-front by backfire operations.

c. Vegetation losses due to direct consumption or fire intensity. Some mountain laurel, hemlock and pine species were severely scorched. Much of the laurel were top-killed and many of the conifer will probably succumb in the near future. Top-killed mountain laurel around Skyland Drive auto turn-outs were cut and lopped by suppression crews. The objective was to improve aesthetics and promote resprouting in these popular visitor use areas.

d. Vegetation on private lands were little impacted by the fire, since fire severity was observed to be very low on the bottomland areas. Some impact on private lands did result from dozer lines constructed for fire suppression. These areas should be rehabilitated in a fashion similar to activities selected for SNP.

e. Non-indigenous invasive plants were directly disturbed by fire and suppression activities. Potential exists for increase of both the distribution and density of these plants within and adjacent to the burn area.

f. Field survey of primary use roads and trails identified some fire damaged trees which were determined to be hazardous. These were removed by suppression personnel.

Vegetation resources provide valuable wildlife forage and habitat, watershed protection, and constitute a visually pleasing landscape. Past management practices have shaped plant community composition and the effects of this fire will have both short and long-term effects.

The fire has removed or top-killed shrub stands which should release associated grasses and forbs. Resprouting shrubs are often invigorated by removal of the above ground canopy. Many hardwood tree species will vigorously and rapidly sprout from roots or the root collar following top-kill. Most of the thick-barked, shade intolerant hardwood species (oaks, walnuts, cherry, yellow poplar, butternut, blackgum) survived the burn with little or no damage. Some of the shade-tolerant hardwood species which have thin cambium (maples, beeches, basswood, hornbeams) have been top-killed or removed by fire, particularly smaller diameter saplings and pole-sized trees. Conifers on the other hand, must reestablish from seed. Depending upon the pine species and the presence of or lack of other plant competition, the fire may result in establishment of regeneration in patches where mineral soil seedbeds were created by fire. Serotinous cone pine species (table mountain pine, pitch pine) may reestablish in patches where cones are present on fire-killed trees or within the soil seedbank. Where the soil seedbank is lacking or has been consumed, Virginia and white pines and hemlock must reestablish from adjacent seed tree sources. Sapling and pole-sized hemlocks were severely damaged or killed in many locations. Where conifer seed sources are lacking, these sites will convert to hardwood species.

Historical evidence indicates that fire has played a varied role in the ecology of Appalachian hardwood forests. Periodic fireshave historically occurred in these vegetation types, but frequency is unknown. Based upon a cursory review of literature and discussion with local resource advisors, it appears that the effects of this fire were within normal bounds of the historic role of fire in this ecosystem type.

Physiological effects of fire on key species are summarized following:

SPECIES	**FIRE TOLERANCE**	**REGENERATION MECHANISM**
Acer pensylvanicum	top-killed	may sprout from base
Acer rubrum	somewhat resistant if large, small trees top-killed	vigorous basal sprouting
Amelanchier arborea	top-killed	basal sprouting, seeds
Betula alleghaniensis	somewhat resistant if large, small trees top-killed	enhanced regeneration from seed, poor sprouter
Carya spp.	somewhat resistant if large, small trees top-killed	basal sprouting
Fraxinus americana	somewhat resistant if large, small trees top-killed	possible basal sprouting
Hamemalis virginiana	top-killed	none noted, possibly from seed
Kalmia latifolia	top-killed	vigorous basal sprouting
Lindera benzoin	probably top-killed	no information available
Liriodendron tulipifera	resistant if mature / trees less than 1 inch diameter top-killed	enhanced regeneration from seed, basal sprouting
Nyssa sylvatica	somewhat resistant if large, small trees top-killed	vigorous basal sprouting
Pinus strobus	intolerant, survives if less than 50% needle scorch, or mature	seed
Prunus serotina	easily top-killed, may survive light fire if over 6 inch diameter	vigorous root sprouting
Quercus prinus	resistant if mature / trees less than 5 inches diameter top-killed	basal sprouting

Quercus rubra	somewhat resistant if large, small trees top-killed	basal sprouting
Robinia pseudoacacia	top-killed	root sprouting
Sassafras albidum	somewhat resistant if large, small trees top-killed	vigorous basal sprouting
Tilia americana	resistant if large, trees less than 5 inches top-killed by low-severity fire	vigorous basal sprouting
Tsuga canadensis	resistant if mature, seedlings and saplings easily top-killed	seed
Viburnum spp.	top-killed	vigorous basal sprouting

- Based upon the pre-fire presence of non-indigenous invasive plant species adjacent to or within the burn, it is highly probable that fire or suppression-related disturbances will result in increased abundance and spread of these plants throughout the fire area.

III. RECOMMENDATIONS

Based on the results of the above observations, the following treatment practices are recommended for implementation to mitigate fire effects to the vegetation resources

Management (specification related)

W-1b, Stabilization of Dozer Line

This treatment is recommended for implementation on the suppression-related dozer line which were established under the powerline right-of-way as the north boundary of the fire (Approximately 2.2 miles). The line was scraped to bare mineral soil. Initial rehabilitation done during the suppression efforts included removing berms along the dozer line edges and some hand dug water bars in the steeper areas. The powerline right-of-way contains numerous species of non-native plant species which will likely colonize the established dozer line. The recommended rehabilitation is to install rolling dips based on established standards, clean up soil berms along the line, and drill seed the line with a native perennial grass seed mix. Rock barriers should be placed in the lines near the park boundary to discourage ATV use. The park should publicize that ATV use is prohibited on park lands and the area should be monitored by law enforcement, especially over the next year to insure ATVs do not damage rehabilitation efforts. Seeding should be completed as soon as possible, to permit seeds to stratify overwinter and germinate in early spring. Seed is recommended to be applied at the rates shown below. Rates are based upon pure live seed. Actual bulk mix must be adjusted accordingly.

Native Grass Seed Mix for Rehabilitation of Dozer Line (Drill Seed at the rate of 50 PLS/sq ft.)		
Species	Mix Ratio (by weight)	Pounds/Acre (PLS*)
Virginia Wildrye (*Elymus virginicus*)	52%	5.5
Big Bluestem (*Andropogon gerardii*)	19%	2.0
Deertongue (*Dicanthelium clandestinum*)	18%	1.9
Switchgrass (*Panicum virgatum*)	11%	1.1
	Total Pounds	10.5

N-2a, Non-Native Invasive Plant Control – Broadcast Seeding

Approximately 10 acres have been identified as critical locations for potential spread of non-indigenous native plants. Pre-burn populations were established and could be expected to spread rapidly if permitted to dominate theses sites. Seeding perennial native grasses into these disturbed sites as soon as possible is recommended to lessen the potential of site capture by undesirable plants. Seeding should be completed as soon as possible, to permit seeds to stratify overwinter and germinate early spring. The use of an ATV-mounted seeder is recommended. Dragging a chain behind the seeder is useful for incorporation of seed into the soil. Seed is recommended to be applied at the rates shown below. Rates are based upon pure live seed. Actual bulk mix must be adjusted accordingly.

Native Grass Seed Mix for Revegetation of Sites Subject to Non-indigenous Plant Invasion (Broadcast Seed at the rate of 80 PLS/sq ft.)		
Species	Mix Ratio (by weight)	Pounds/Acre (PLS*)
Virginia Wildrye	52%	8.7
Big Bluestem	19%	3.1
Deertongue	18%	3.1
Switchgrass	11%	1.8
	Total Pounds	16.7

N-2b, Non-Native Invasive Plant Control

Post-fire monitoring will be initiated in areas near known populations of non-indigenous plant species populations and in areas of higher fire intensity which generally correspond to areas with high gypsy moth tree mortality. There are numerous areas where known populations of non-indigenous plant species populations are known in or adjacent to the burn area. These areas may provide seed and/or vegetative reproduction into the burn areas. If new invasions into the burn area are not controlled these non-indigenous species may gain new footholds into forested areas and will impact future forest community development. The areas with heavy gypsy moth tree mortality have reduced overstory tree canopy and varying levels of regeneration. Many of these areas were dominated by sapling and small pole-sized shade tolerant tree species, which

remained after overstory mortality occurred. Most of these shade tolerant species are highly susceptible to fire damage and mortality. Where fire intensities were more intense, woody regeneration may have been killed or set back enough to allow for the establishment of non-indigenous plant species. If monitoring identifies the presence of non-indigenous species, spot control should be initiated immediately. Control methods should be matched to the species of concern which could consist of hand pulling, manual cutting or herbicide application (both basal and foliar application). Herbicide selection should be consistent with NPS integrated pest management policies, and application must adhere to agency policy and NEPA requirements. Following control practices, the areas should continue to be monitored for treatment effectiveness and if necessary, additional treatments should follow. Additional supplemental funding may be required if undesirable plants become widely distributed, and necessary control techniques extend beyond the scope of spot control practices.

N-2c, Non-native Invasive Plant Control – Hydroseeding

Approximately 15 acres have been identified as critical locations for potential spread of non-indigenous native plants. Pre-burn populations were established and could be expected to spread rapidly if permitted to dominate theses sites. Additional sources of invasive plant introduction include vehicle traffic and other human use of these locations. Some soil movement is possible during periods of heavy precipitation, due to the steepness of road cut banks. For these reasons, seeding perennial native grasses into these disturbed sites as soon as possible is recommended to lessen the potential of site capture by undesirable plants. Suitable sites include bare uphill slopes and ditches adjacent to Skyline Drive where it intersects the burned area. Other sites recommended for treatment include the cleared areas downslope and adjacent to the roadside scenic parking turn-outs. Due to the steepness of some of the road cut slopes, it is recommended that hydroseeding be utilized as the application technique. Seeding should be completed as soon as possible, to permit seeds to stratify overwinter and germinate early spring. Seed is recommended to be applied at the rates shown below. Rates are based upon pure live seed. Actual bulk mix must be adjusted accordingly. Do not include annual grass species into the mix, as successful establishment of native species will be significantly reduced by this practice. Native grasses should not be mowed during the first season after establishment, and thereafter should be mowed higher than turf grasses to maintain vigor of native grasses.

Native Grass Seed Mix for Revegetation of Sites Subject to Non-indigenous Plant Invasion (Hydroseed at the rate of 80 PLS/sq ft.)		
Species	Mix Ratio (by weight)	Pounds/Acre (PLS*)
Virginia Wildrye	52%	8.7
Big Bluestem	19%	3.1
Deertongue	18%	3.1
Switchgrass	11%	1.8
	Total Pounds	16.7

P-1, Long-term Monitoring Plot Reestablishment

Shenandoah National Park is one of the four original prototype inventory and monitoring programs in the National Park Service. As part of the development of the inventory and monitoring program, forest plant community monitoring plots were established. Forest community monitoring plots were selected based on the vegetation cover type map developed in 1985, and

installation began during 1987. There are presently 135 permanent plot locations scattered across the park landscape. Each site consists of three 24x24 meter tree plots with nested shrub and regeneration plots found within. The purpose of these plots is to monitor forest community composition (trees, shrubs, woody regeneration and herbaceous composition) in the seven major forest community types with additional plots located in specialized habitats or for special projects such as a deer exclosure study. Sixteen sites are located in the burn area. BAER resource advisors assessed and documented damage to plot corner monuments, tree tags and tree tag nails which melted as a result of the fire. In an effort to maintain the existing forest community monitoring program, the 16 sites should be re-established with new plot stakes, tree nails, and tree tags. Following evaluation, the decision was made to modify the materials used in marking plot corners and tagging trees such that future plot work will use materials less susceptible to fire effects (brass tags, stainless steel tree nails, and iron corner stakes). Following re-establishment of the plots within the burn area, the vegetation will be inventoried and the data compared to previous forest plot inventories to document the initial effects of the fire on the plant communities.

F-1, Base Camp Rehabilitation

The lawn area adjacent to the base camp at park headquarters was the location for vehicle parking during the fire incident. Hundreds of vehicles crossed the lawn. Effects to the area include soil compaction and worn areas in the grass turf. The BAER team recommends aerating the soil with a plug aerator, which extracts plugs to a depth of 2-4 inches according to standard turf management practices. A double coverage aeration is recommended which consists of aerating with one pass and then a second aeration pass at right angles to the first.

Monitoring (specification related)

M-1a, Monitoring: Vegetation

Documentation of fire effects is needed to identify areas of plant mortality which may be potential areas for non-indigenous species invasion and to plan for post-fire monitoring. Aerial photography coverage is recommended for the entire burn area at 1:12,000 nominal scale. Photography should be color-infrared and taken in early summer following the fire (2001) so that tree mortality will be visible. Photography should include adequate coverage of the park boundary to identify areas where potential areas of exotic species encroachment may be occurring.

M-1b, Monitoring: Vegetation Recovery

Monitor the effects of seeding on curtailing non-indigenous plants. Monitor the potential invasion of non-indigenous plants into burned areas located in heavy gypsy moth mortality areas.

Seven sites have been identified for re-seeding for controlling non-indigenous plants. These sites should be monitored twice (spring and fall) to determine the effectiveness of the seeding operations for stabilizing the sites and the presence of non-indigenous plants. The results of monitoring in these areas will be the basis for re-seeding if necessary, spot treatment to control non-indigenous plants during the first growing season following the burn, and the justification for additional monitoring or spot treatments if required.

The gypsy moth killed large areas of oak forests in Shenandoah National Park in the early to mid-1990s. In some of these areas, regeneration of woody species was minimal, depending on the amount of advanced regeneration in the understory or the availability of nearby seed trees. More severe fire intensity appeared to occur in some of these gypsy moth affected areas and regeneration of tree species may have been set back. The potential for invasion by non-indigenous species is high. If non-indigenous species become established in these areas, many of which are located in large contiguous forested areas, these areas will become reservoirs of non-indigenous species which may multiply and provide seeds or vegetative reproduction for

adjacent areas. Due to the frequency of large disturbances in these forested areas, non-indigenous plant reservoirs could lead to the spread of these plants throughout relatively intact natural forest communities. Using the existing maps of gypsy moth defoliation and aerial photography, field surveys should be done to confirm locations of high tree mortality. Approximately 500 acres of mortality should be monitored. Trails within the areas should be walked to determine the presence of non-indigenous species and if found these should be located and mapped using GPS. At each monitoring site, three transects should be established with appropriate spacing between transects which run at right angles to the trails. Non-indigenous species should be surveyed along the entire length of each transect twice during the year, both spring and fall. Woody regeneration should be sampled at the end of the growing season with circular plots along the transects. Photographs should be taken along the transects to characterize vegetation for reports or for showing trends for future efforts if required. Results of the monitoring should be analyzed and summarized for the accomplishment report. In the event that non-indigenous species are found, spot treatments should be done and a request for additional monitoring should be made.

Management (non-specification related)

Non-indigenous invasive plants have been identified as the primary threat to maintenance of native plant communities within SNP. Field reconnaissance confirms that potential exists for widespread distribution of invasive plants, this potential will remain regardless of wildfire activity. Diligent monitoring and spot control of undesirable plants must remain an important primary natural resource activity. Development of a long-term invasive plant monitoring and control strategy should be a management priority. This plan should be integrated into all maintenance activities and other functions on a Park Unit-wide basis.

A critical element of this invasive plant management plan, must be development of a road and public use area strategy designed to limit unnecessary soil disturbance or removal of native herbaceous vegetation. Primary transportation roadways should limit ditch maintenance and cut slope disturbance as much as possible by utilizing design and materials which minimize maintenance. Secondary road systems not open for public use, should be maintained in a stable road surface condition such that frequent road grading and other disturbances are unnecessary. Design specifications are key to this process. Consider incorporation of the following practices into the secondary road system design.

1) Limit road width to the minimum required for administrative use.

2) Design reduced maintenance structures into the roadway. Road maintenance should incorporate integrated pest management concepts and techniques.

    a. Utilize rolling road grades (dips) and lead-out ditches for drainage, instead of shoulder ditches and culverts whenever possible.

    b. Pull berms into roads to narrow road width and recrown road surfaces.

    c. Revegetate shoulders with native grasses after disturbance.

    d. Utilize hardened (rock) crossings for stream crossing, instead of flood and erosion prone culverts whenever possible.

    e. Vegetate surfaces of little-used roads, by drill-seeding low-growing native grass or forb species directly into the roadbed. A stable well-drained road surface does not require grading. Where roadways receive more frequent use, add crushed surface rock to reduce maintenance and soil disturbance.

    f. Monitor roadways annually for the incidence of invasive plant species.

g. Native grasses should not be mowed during the first season after establishment, and thereafter should be mowed higher than turf grasses to maintain vigor of native grasses.

IV. CONSULTATIONS

James Akerson, Forest Ecologist, Shenandoah NP
Reed Engle, Branch Chief, Cultural Resources, Shenandoah NP
Steve Bair, Backcountry/Wilderness Ranger, Shenandoah NP
Shawn Green, Backcountry/Wilderness Ranger, Shenandoah NP
Doug Wallner, Prescribed Fire Coordinator, USDI-National Park Service, Northeastern Region
Tom Baily, Soil Scientist, USDA - George Washington-Thomas Jefferson National Forests
Jennifer Kujawski, Natural Resource Conservationist, USDA -Natural Resources Conservation Service, National Plant Materials Center, Maryland
John Dickerson, Plant Materials Specialist, USDA -Natural Resources Conservation Service, Plant Materials Center, New York
Robin Ernst, Ernst Conservation Seeds, Meadville, Pennsylvania

V. REFERENCES

Fire Effects Information System. 1999. Fire Effects Information System Online. www.fs.fed.us/database/feis/plants/ (viewed November 17, 2000).

Effects of Fire on Threatened and Endangered Species: An Annotated Bibliography, USDI – National Biological Service, Information and Technology Report 2, August 1995.

Silvics of North America, USDA Forest Service, Agriculture Handbook 654, December 1990.

Ludwig, J.C., G.P. Fleming, C.A. Pague, and T.J. Rawinski. 1993. A Natural Heritage Inventory of Mid-Atlantic Region National Parks in Virginia: Shenandoah National Park. Natural Heritage Technical Report #93-5. Department of Conservation and Recreation Division of Natural Heritage, Richmond, Virginia.

Shenandoah National Park, Long Term Ecological Monitoring System, USDI - National Park Service, September 1990.

Shenandoah National Park, Resource Management Plan, USDI - National Park Service, September 1998.

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U. S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION TEAM

Shenandoah Complex Fire

WILDLIFE AND FISHERIES RESOURCE ASSESSMENT

I. OBJECTIVES

- Assess effects of fire and suppression efforts on federal and state endangered species and their habitats.
- Assess effects of fire and suppression efforts along affected streams relative to the potential for increased sedimentation and impacts on fishery resources including habitat.
- Assess effects of fire on hard mast crops.
- Asses effects of fire and suppression efforts within a long term monitoring plot associated with the MAPS (Monitoring Avian Productivity and Survivorship) program.

II. ISSUES

- Two federally listed species occur both within and in areas adjacent to the area affected by the fire and associated suppression activities.
- The fires burned entirely through two park watersheds (Hughes River and Hazel River) and burned portions of three other watersheds (Pass Run, Dry Run and Thornton River). These streams contain populations of both native eastern brook trout and exotic brown and rainbow trout in addition to a number of other fish species.
- The size of these fires relative to a bumper crop of hard mast (primarily red oak acorns) and potential impacts to hard mast on the forest floor and to wildlife species that depend on mast crops as a major source of food over the winter months.
- Damage to markers, monuments and habitat within a long term monitoring plot associated with the MAPS program.

III. OBSERVATIONS

A. Background

The purpose of this BAER wildlife assessment is to determine effects from the fire and associated suppression activities on federally listed species and associated habitat, fish species and associated habitat, hard mast crops on the forest floor and a large long term monitoring plot. Species in question are listed under C. Findings. These species have been documented through routine field surveys and monitoring activities conducted within the park from the 1950s through the present.

The Shenandoah Fire Complex burned approximately 24, 200 acres (37.4 sq. mi.) between October 29 and November 13. Containment occurred on November 12 and the fires were pronounced controlled on November 13. The fire involves over 36 perimeter miles, 11.9 miles of dozer line and 27.6 miles of hand line. Fire retardant (Phos-Chek WD881, Monsanto Co.) was used along some ridgelines for containment and control.

The fires affected large areas along the eastern and western slopes of the Blue Ridge within a three county (Page, Rappahannock and Madison) area. The affected slopes, ridgelines and hollows were dominated by a mixed mosaic of overstory tree species including northern red oak (*Quercus rubra*), chestnut oak (*Quercus prinus*), white oak (*Quercus alba*), yellow poplar (*Liriodendron tulipifera*), green ash (*Fraxinus pennsylvanica*), American basswood (*Tilia americana*), red maple (*Acer rubrum*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), hickory species and birch species. Refer to the Vegetation Assessment for detailed descriptions of the pre-fire landscape, including topography and vegetation communities.

Eastern deciduous forests in the mid-Atlantic area which includes Shenandoah National Park are dominated by mast producing oak and hickory species. Hard mast in the form of acorns and hickory nuts are an important dietary component of a broad range of wildlife species including white-tailed deer (*Odocoileus virginiana*), black bear (*Ursus americana*), wild turkey (*Meleagris gallopavo*), gray squirrel (*Sciurus carolinensis*), a number of other bird species and several small mammal species. Investigations indicate that cycles in the production and availability of hard mast crops are directly correlated with the activity, reproductive success and population dynamics of these species and the major predators of these species.

Park lands are known to contain one of the greatest concentrations of nearly pure eastern brook trout (*Salvelinus fontinalis*) streams in the eastern United States. Naturalized populations of brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) are known to occur in only five of the 90 plus recognized trout streams within the park. Collectively, these streams also support 27 other fish species including dace, darters, suckers, eels, shiners, sculpin, chubs, and sunfish. All park streams are classified as sensitive to acidification and all are subject to periods of drought and flood events. Most park streams are moderate to high gradient streams and the effects of high volume flood events, and associated erosion in the form of sediment and debris flows can have devastating short to medium term impacts on park fish populations.

The Shenandoah salamander (*Plethodon shenandoah*), a small, terrestrial woodland salamander, is known from three isolated populations within Shenandoah National Park. In an effort to provide immediate protection to the species and associated habitats, the Shenandoah salamander was listed as an endangered species in August, 1989.

Peregrine falcons (*Falco peregrinus anatum*) were hacked from several sites within the park from 1989 to 1993 as part of a larger objective to restore falcon populations to mountain habitats throughout western Virginia. A number of sites park wide were identified as suitable locations for falcon eyries which could significantly contribute to restoration efforts.

B. Reconnaissance Methodology and Results

Determination of pre-fire population estimates, associated habitats and habitat status within the burned area were accomplished through periodic field surveys and routine monitoring activities by park staff, personnel from the Virginia Department of Game and Inland Fisheries, the U.S. Fish and Wildlife Service, researchers and volunteers from the 1950s through the present. These data are located at the Inventory and Monitoring building within the park headquarters campus at Luray, VA.

Several sites including both of the Pinnacles population isolates of the Shenandoah salamander, the Pinnacles MAPS station, the lower Hughes River, and the lower Shaver's Hollow were visited as the wildlife and fisheries component of the post-fire assessment. These sites were all visited on November 14, 2000. Shenandoah salamander habitat was inspected visually to assess the amount and relative intensity of fire in those areas. The Pinnacles MAPS station was inspected visually to assess post-fire habitat condition, relative burn intensity and the condition of monuments and markers within the 22 acre site. The two streams were assessed visually to determine relative burn intensities and any visible effects of fire suppression activities adjacent to or within the affected stream channels. Throughout the day, hard mast (mostly red oak acorns) were inspected for soundness and relative availability in post-fire environments.

C. Findings

This section of the BAER report discusses impacts of the fire and related suppression activities on the wildlife and fisheries resources listed above and potential impacts to associated habitats or activity of the species. Direct effects as described in this section refer to mortality or disturbance that results in displacement of the species. Indirect effects refer to modification of habitats and/or behaviors, resulting in changes in population size and seasonal use of specific habitats.

FISHERIES/WILDLIFE IMPACTS

While negative short term impacts from the fire will be realized by many terrestrial and some avian wildlife species within the burn area, long-term impacts will likely be positive. The timing of the fire (post leaf fall) and the type of fuels consumed (primarily leaves and other fine fuels present on the surface) resulted in a relatively light burn in most areas. Areas of hot, intense burns appeared to be isolated and relatively small. Generally, there are no concerns associated with listed species or their habitats as justified below for each species.

Shenandoah Salamander (*Plethodon shenandoah*)

Shenandoah salamanders inhabit north and west facing talus slopes within the population isolates where they are known to occur. These populations and associated habitats are completely surrounded by the closely related and competitive red-backed salamander (*Plethodon cinereus*) that prefers moist habitats dominated by accumulations of humus and woody debris. The Shenandoah salamander is generally active at or near the surface from late April through September. These salamanders have occasionally been observed on the surface as late as mid October but the first freeze of the fall season typically triggers the overwintering hibernation for this species. In regards to the two population isolates within the burn, the larger area was nearly pristine as the fire burned all the way around but not through the habitat. The smaller isolate was burned completely through but only accumulations of leaves and other fine fuels were impacted. At the time of the fire, these salamanders were likely in deep hibernation for the winter months.

DIRECT EFFECTS: None

INDIRECT EFFECTS: None

Peregrine Falcon (*Falco peregrinus anatum*)

Following several years of persistent hacking at cliff sites within the park's Central District, a pair of peregrines selected an eyrie site near the summit of Stony Man Mountain and successfully fledged broods of two to three in 1994, 1995 and 1997. Peregrines typically arrive at the eyrie in late winter or early spring and disperse within a few weeks of brood fledging in mid to late summer. The known eyrie at Stony Man is well outside of the area affected by the fire. Old Rag Mountain contains suitable eyrie habitat but is not known to have been used in the past. Depending on the intensity and severity of the burn on the slopes of Old Rag, the fires have improved conditions there for eyrie establishment. Peregrines, other than isolated migrants are not known to inhabit areas within the park during the fall and winter months.

DIRECT EFFECTS: None

INDIRECT EFFECTS: None

OTHER SPECIES/AREAS OF CONCERN

Aquatic Communities/Fish

Along both the Hughes River and Dry Run, stream banks are well stabilized by large granitic boulders and areas of exposed bedrock. The fires along these streams burned primarily leaf litter and fine fuels in a mosaic pattern down to and away from the stream bank. Stream bank stabilization did not appear to be compromised at any of the sites inspected. Large woody debris in the stream did not appear to be compromised and in some cases there were additional trees that had been dropped across the stream channel. Only in Shaver's Hollow was there evidence that trees crossing the stream channel had been cut to function as a firebreak. In these cases, the cross sections were dropped directly into the stream channel. This should serve as a short term benefit in terms of habitat for fish and aquatic macroinvertebrates.

The potential for increased erosion due to the burn or associated suppression activities (firebreak construction) appears little more than normal for the winter period. The short term effect of ash washing into the stream remains unknown

DIRECT EFFECTS: Probably minimal

INDIRECT EFFECTS: None likely

Hard Mast

Red oak and other oak species produced a bumper crop of acorns this year, many of which were present on the forest floor at the time of the burn. The principal concern was that a significant portion of these would have been totally incinerated or otherwise have greatly reduced food value to wildlife. Upon inspection at a number of sites, some acorns were lost due to the fire. Many, however, were still intact and it appeared that some had fallen after the fire had burned through some areas. Acorn loss was likely most severe in areas experiencing the most intense burns. These however, were relatively small and widely scattered in extent.

DIRECT EFFECTS: Probably minimal

INDIRECT EFFECTS: None likely

Monument and Habitat Damage within MAPS Station

The fire burned through this 22 acre long term monitoring site with varying degrees of intensity. Overall, there was considerable but not complete top kill of the dominant understory shrub, mountain laurel (*Kalmia latifolia).* The densest stand of mountain laurel near the center of the site was somewhat intact. Approximately half of the PVC monuments and markers were slighty melted to disfigured. Fortunately, all markers and monuments within the site were GPS'd and none were completely lost. Bird community response will be interesting to follow at this site as there are nine years of data existing from this site prior to the fire.

IV. RECOMMENDATIONS

A. Management (specification related)
No Action specified.

B. Monitoring (specification related)
No Action Specified

C. Management (non-specification related)
Recommend multiyear monitoring effort within affected Shenandoah salamander habitat to assess the status of these populations in the post burn environment and to determine relative densities in these areas.

V. CONSULTATIONS

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James B. Atkinson, Wildlife Biologist
Shenandoah National Park (540) 999-3433

APPENDIX II. ENVIRONMENTAL COMPLIANCE DOCUMENTATION

- **NATIONAL ENVIRONMENTAL POLICY ACT, COMPLIANCE DOCUMENTATION**
- **CATEGORICAL EXCLUSION CHECKLIST**



U.S. DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION TEAM
SHENANDOAH COMPLEX BURNED AREA EMERGENCY REHABILITATION PLAN

ENVIRONMENTAL COMPLIANCE CONSIDERATIONS, DOCUMENTATION, AND CONSULTATIONS

A. FEDERAL, STATE, AND PRIVATE LANDS ENVIRONMENTAL COMPLIANCE RESPONSIBILITIES

All projects proposed in the Shenandoah Complex Burned Area Emergency Rehabilitation (BAER) Plan that are prescribed, funded, or implemented by Federal agencies on Federal, state, or private lands are subject to compliance with the *National Environmental Policy Act* (NEPA) in accordance with the guidelines provided by the *Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); Department of the Interior Manual, Part 516 DM 6, Appendix 1, and National Park Service NEPA Guidelines, DO-12.* This Appendix documents the BAER Team considerations of NEPA compliance requirements for prescribed rehabilitation and monitoring actions described in this plan for all jurisdictions or ownerships affected by the Shenandoah Complex burned area emergency. The National Park Service through Shenandoah National Park will act as the lead agency for the Shenandoah Complex BAER Plan.

B. RELATED PLANS AND CUMULATIVE IMPACTS ANALYSIS

Agency Management Plans. The following plans were reviewed to assure that BAER recommendations adhered to existing land management intent and policy.

- Shenandoah National Park General Management Plan and Environmental Assessment (1983)
- Five Year Strategic Plan for Shenandoah National Park: Fiscal Years 2001-2005 (2000)
- Shenandoah National Park Backcountry & Wilderness Management Plan (1998)
- Resource Management Plan for Shenandoah National Park (1998)
- National Park Service Strategic Plan (1997).

It has been determined that actions proposed in the Shenandoah Complex BAER Plan, within the boundaries of Shenandoah National Park as well as private land ownerships, are consistent with the management objectives established in the plans reviewed.

Cumulative Impact Analysis. Cumulative effects are the environmental impacts resulting from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, both Federal and non-Federal. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. The emergency protection and rehabilitation treatments for areas affected by the Shenandoah Complex, as proposed in the Shenandoah Complex BAER Plan, do not result in an intensity of impact (i.e. major ground disturbance, etc.) that would cumulatively constitute a significant impact on the quality of the environment. The treatments are consistent with existing management plans and associated environmental compliance documents and categorical exclusions listed below.

C. APPLICABLE AND RELEVANT CATEGORICAL EXCLUSIONS

National Park Service. The individual actions proposed in this plan for Shenandoah National Park are Categorically Excluded from further environmental analysis as provided for in the Department of the Interior Manual Part 516 DM 6 Appendix 1 and (as the lead agency) NPS NEPA Guidelines, DO-12. All applicable and relevant Department and NPS Categorical Exclusions are listed below. Department exceptions 516 DM 2 do not apply to any of the individual

actions proposed. Categorical Exclusion decisions were made with consideration given to the results of required emergency consultations completed by the BAER Team and documented in Section E below.

Applicable Departmental and NPS Categorical Exclusions

516 DM 2 App. 2, 1.4	Law enforcement and legal transactions, including such things as arrests, investigations, patents, claims, legal opinions, and judicial activities including their initiation, processing, settlement, appeal or compliance.
516 DM 2 App. 2, 1.6	Non-destructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research and monitoring activities.
516 DM 2 App. 2, 1.11	Activities which are educational, informational, advisory or consultative to other agencies, public and private entities, visitors, individuals or the general public.
516 DM 6 App. 7.4 B(9)	Adoption or approval of surveys, studies, reports, plans and similar documents which will result in recommendations or proposed actions that would cause no or minimal environmental impact.
516 DM 6 App. 7.4 C(3)	Routine maintenance and repairs to non-historic structures, facilities, utilities, grounds and trails.
516 DM 6 App. 7.4 C(4)	Routine maintenance and repairs to cultural resource sites, structures, utilities and grounds under an approved Historic Structures Preservation Guide or Cyclic Maintenance Guide; or if the action would not adversely affect the cultural resource.
516 DM 6 App. 7.4 C(5)	Installation of signs, displays, kiosks, etc.
516 DM 6 App. 7.4 C(12)	Minor trail relocation, development of compatible trail networks on logging roads or other established routes, and trail maintenance and repair.
516 DM 6 App. 7.4 C(19)	Landscaping and landscape maintenance in previously disturbed or developed areas.
516 DM 6 App. 7.4 C(20)	Construction of fencing enclosure or boundary fencing posing no effect on wildlife migrations.
516 DM 6 App. 7.4 D(6)	Designation of trailside camping zones with no or minimal improvements.
516 DM 6 App. 7.4 E(1)	Archeological surveys and permits, involving only surface collection or small-scale test excavations.
516 DM 6 App. 7.4 E(2)	Day-to-day resource management and research activities.
516 DM 6 App. 7.4 E(4)	Stabilization by planting native plant species in disturbed areas.
516 DM 6 App. 7.4 E(6)	Restoration of non-controversial native species into suitable habitats within their historic range, and elimination of exotic species.

D. STATEMENT OF COMPLIANCE FOR THE SHENANDOAH COMPLEX BURNED AREA EMERGENCY REHABILITATION PLAN

This section documents consideration given to the requirements of specific environmental laws in the development of the Shenandoah Complex BAER Plan. Specific consultations initiated or completed during development and implementation of this plan are documented in the next section. The following executive orders and legislative acts have been reviewed as they apply to the Shenandoah Complex BAER Plan.

1. **National Historic Preservation Act (NHPA).** The BAER Team archeologists have initiated necessary consultation with the Virginia State Historic Preservation Office (SHPO) regarding treatments proposed in the Shenandoah Complex BAER Plan.
2. **Executive Order 11988. Floodplain Management.** No qualifying treatments are proposed within a 100-year floodplain.
3. **Executive Order 11990. Protection of Wetlands.** No qualifying treatments are proposed within jurisdictional wetlands. The U.S. Army Corp of Engineers was consulted.
4. **Executive Order 12372. Intergovernmental Review.** Coordination and consultation is ongoing with affected State and local agencies. A copy of the BAER Plan will be disseminated to all affected agencies.
4. **Executive Order 12892. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.** All Federal actions must address and identify, as appropriate, disproportionally high and adverse human health or low-income populations, and Indian Tribes in the United States. The BAER Team Environmental Protection Specialist has determined that the actions proposed in this plan will result in no adverse human health or environmental effects for minority or low-income populations.
5. **Executive Order 13112. Invasive Species.** Federal Agencies must not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasives species. BAER Team and Shenandoah vegetation specialists believe the actions recommended in this Plan will not inadvertently allow invasive species introduction and spread, and will moreover actively inhibit them.
6. **Endangered Species Act.** The BAER Team wildlife biologist and vegetation specialists have consulted with the U.S. Fish and Wildlife Service and the Virginia Department of Game & Inland Fish regarding actions proposed in this plan and potential affects on Federally and State listed species and have determined that there is no effect. Individual agencies are responsible for continued consultations during plan implementation.
7. **Secretarial Order 3127.** There are no known contaminated sites on NPS lands affected by neither the Shenandoah Complex nor the BAER Plan.
8. **Clean Water Act.** No treatments are proposed within jurisdictional wetlands (see number 3 above).
9. **Clean Air Act.** Federal Ambient Air Quality Primary and Secondary Standards are provided by the National Ambient Air Quality Standards, as established by the U.S. Environmental Protection Agency (EPA) (Clean Air Act, 42 U.S.C. 7470, et seq., as amended). The BAER Team Environmental Protection Specialist has determined that treatments prescribed in the Shenandoah Complex burned area will have short-term minor impacts to air quality that would not differ significantly from routine land use practices for the area. Long-term treatments proposed in this plan would be expected to have a beneficial impact to air quality through stabilization of ash and soils within the Shenandoah Complex burned area.

E. CONSULTATIONS

The following consultations have taken place specific to the Shenandoah Complex Burned Area Emergency Rehabilitation Plan.

Allegheny Power Company

- Thomas McCampbell, Forester, Luray Field Office: telephone conversation November 16, 2000, regarding powerline right-of-way and access road management. APC is supportive of waterbars or rolling dips and grass seeding being carried out on the access road.

ARAMARK, Inc.

- Michael Slowinski, Shenandoah Properties General Manager: left message on his telephone voicemail, November 16, 2000, regarding fire effects, BAER planning, inviting their input, and invited ARAMARK to attend the Monday, 11/20/2000, close-out presentation.
- Penny Gray, Luray Office Manager: telephone conversation November 16, 2000, with discussion of similar points as above.

Department of Interior, National Park Service

- Gregory Stiles, Assistant Park Chief Ranger, Shenandoah National Park: clarification given November 15, 2000, regarding Allegheny Power Company and SNP relationship surrounding powerline right-of-way.

Madison County Administration

- Rhoda Johnston, Administrative Assistant to the County Administrator: telephone conversation November 16, 2000, advising them of the general fire effects, BAER planning activities and expertise involved. Invited them to attend the Monday, 11/20/2000, close-out presentation.

Page County Administration

- Dean BeLer, County Administrator: telephone conversation November 16, 2000, advising him of the general fire effects, BAER planning activities and expertise involved. Invited them to attend the Monday, 11/20/2000, close-out presentation.

Potomac Appalachian Trail Conference

- Kerry Snow, Trail Manager: discussed impacts of fire to current trail access, closures, probable trail re-openings, and trail maintenance needs.

Rappahannock Country Administration

- John McCarthy, County Administrator: telephone conversation November 16, 2000, advising him of the general fire effects, BAER planning activities and expertise involved. Invited them to attend the Monday, 11/20/2000, close-out presentation.

US Army Corp of Engineers

- Ron Stouffer, Environmental Scientist, Northern Virginia Field Office: in a telephone conversation on November 16, 2000, we advised him of the fire impacts to the burned area, relating that we do not plan any stream/streambank mitigation. He advised us that federal permitting is not required to allow caterpillar tractors to cross live streams in non-emergency settings. (In an earlier telephone communication of February 9, 2000, Mr. Stouffer advised us that streamside invasive vegetation treatments without excavation do not need permits from that agency.)

USDA-Natural Resource Conservation Service

- Jennifer Kujawski, Resource Conservationist, Beltsville, MD: telephone conversations with two BAER team members on November 16, 2000, regarding suitable native grass seed for site rehabilitation and invasive species avoidance for various site conditions within the burn.

US Fish and Wildlife Service

- Andrew Mosier, Endangered Species Biologist, Annapolis, MD: telephone conversation on November 14, 2000, regarding fire status, and potential impacts to stream waters, fish and the listed Shenandoah salamander. No remediation was advised.

Virginia Department of Forestry

- Michael Griffin, Regional Forester (R-3), Charlottesville, VA: telephone conversation on November 17, 2000, regarding fire status, impacts, and BAER findings and recommendations to date. VDF will take care of fireline rehabilitation on private lands. On steeper fireline sections, they will consider seeding with grasses to hold soils in place. He would like to visit on site to discuss soil mitigation measures.

Virginia Department of Game & Inland Fish

- Richard Reynolds, Wildlife Diversity Biologist, Verona Office: telephone conversation on November 14, 2000, regarding fire status, and potential impacts to stream waters, fish and the listed Shenandoah salamander. No remediation was advised.

Virginia Department of Transportation

- Charles Campbell, Maintenance Manager, for Randy Kiser, Resident Engineer, Luray Office: in telephone conversation November 17, 2000, we asked whether they had any concerns or mitigation needs for VDOT roads impacted by the Shenandoah Complex. They have none.
- Donald Gore, Resident Engineer, Culpeper Office: in telephone conversation November 15, 2000, we asked whether he had any concerns or mitigation needs for VDOT roads impacted by the Shenandoah Complex. He had none.

Virginia State Historic Preservation Office

- Kara Metz, VA-SHPO staff: telephone conversation of November 16, 2000, outlining the BAER process, planning efforts and reconnaissance to date, and work items that may flow from the Plan. She agreed that the Plan does not constitute an undertaking under Section 106, NHPA. Subsequent land actions that are ground disturbing or impact cultural sites must have Section 106 consultation with VA-SHPO.

Public Outreach

The BAER Team and Shenandoah National Park staff conducted public outreach efforts in the following ways.

- Telephone contacts with the administrative offices of the three impacted counties: Rhoda Johnston for Steven Utz, Madison County Administrator, Dean BeLer, Page County Administrator, and John McCarthy, Rappahannock County Administrator.
- Press conference on-site within the fire area on Friday, November 17, 2000.
- Various media interviews on fire effects and BAER planning activities.
- Press release of BAER Team activity and goals, November 14, 2000.
- A fact sheet titled, "Fire Summary and Tips for Trail Overseers," forwarded to volunteer and governmental offices, including the Potomac Appalachia Trial Club, Appalachia Trail Conference, and NPS-Appalachia Trail Park Office.
- Open meeting at the SNP Headquarters Office on November 20, 2000, to discuss findings and recommendations of the BAER Team.

F. NEPA CATEGORICAL EXCLUSION DOCUMENTATION

Project Description/Location:

As described in the *Shenandoah Complex Burned Area Emergency Rehabilitation Plan*, this project includes field monitoring and treatments recommended to address impacts caused by the Shenandoah Complex, a wildfire that took place during the period October 30 – November 8, 2000. This plan encompasses findings and recommendations for work on 24,197 acres impacted roughly from U.S. Highway 211 south and encompassing Old Rag Mountain. (1,112 acres were impacted by the wildfire on private lands of Madison, Page, and Rappahannock Counties. The Commonwealth of Virginia, Department of Forestry, is the lead agency for rehabilitation efforts of those lands.) The Plan describes monitoring and necessary mitigative measures to address impacts to soils, waters, vegetation, wildlife, Federal and State listed species, trails and roads, and cultural resources. The Plan also addresses the need for monitoring and controlling unwanted invasive non-native species potentially exacerbated by fire effects. The Plan provides general and specific action items.

Mandatory Criteria (A-M). **Would the proposal, if implemented**:

	Yes	No	Data Needed to Determine
A. Have significant adverse effects on public health or safety?		X	
B. Have adverse effects on such unique characteristics as historic or cultural resources, park, recreation or refuge lands, wilderness areas, wild or scenic rivers, sole or principal drinking water aquifers, prime farmlands, wetlands, floodplains, or ecological significant or critical areas, including those listed on the National Register of Natural Landmarks?		X	
C. Have highly controversial environmental effects?		X	
D. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?		X	
E. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?		X	
F. Be directly related to other actions with individually insignificant, but cumulatively significant environmental effects?		X	
G. Have adverse effects on properties listed or eligible for listing on the National Register of Historic Places?		X	
H. Have adverse effects on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have adverse effects on designated Critical Habitat for these species?		X	

	Yes	No	Data Needed to Determine
I. Require compliance with Executive Order 11988 (Floodplain Management), Executive Order 11900 (Protection of Wetlands), or the Fish and Wildlife Coordination Act?		X	
J. Threaten to violate a federal, state, local or tribal law or requirement imposed for the protection of the environment?		X	
K. Require a permit from a federal, state or local agency to proceed, unless the agency from which the permit is required agrees a CE is appropriate?		X	
L. Have the potential for significant impact as indicated by a federal, state or local agency or Indian Tribe?		X	
M. Have the potential to be controversial regardless of its impact?		X	

Park Specific Criteria:

Are measurable impacts possible on the following physical, natural or cultural resources?

	Yes	No	Data Needed to Determine
1. Geological resources – soils, bedrock, streambeds, etc.		X	
2. From geohazards		X	
3. Air Quality, Traffic, or from Noise		X	
4. Water quality or quantity		X	
5. Streamflow characteristics		X	
6. Marine or Estuarine Resources		X	
7. Floodplains or wetlands		X	
8. Land use, including occupancy, income, values, ownership, type of use		X	
9. Rare or unusual vegetation – old growth timber, riparian, alpine		X	
10. Species of special concern (plant or animal; state or federal listed or proposed for listing) or their habitat		X	

	Yes	No	Data Needed to Determine
11. Unique ecosystems, biosphere reserves, World Heritage sites		X	
12. Unique or important wildlife or wildlife habitat		X	
13. Unique or important fish or fish habitat		X	
14. Introduce or promote non-native species (plant or animal)		X	
15. Recreation resources, including supply, demand, visitation, activities, etc.		X	
16. Visitor experience, aesthetic resources		X	
17. Cultural resources, cultural landscape, sacred sites, etc.		X	
18. Socioeconomics, including employment, occupation, income changes, tax base, infrastructure, etc.		X	
19. Minority and low income populations, ethnography, size, migration patterns, etc.		X	
20. Energy resources		X	
21. Other agency or tribal land use plans or policies		X	
22. Resource, including energy, conservation potential		X	
23. Urban quality, gateway communities, etc.		X	
24. Long-term management of resources of land/resource productivity		X	
25. Other important environmental resources.		X	

Please answer the following questions.

1. Are the personnel preparing this form familiar with the site, and/or has a site visit been conducted?

Yes. The BAER Team of specialists conducted field reconnaissance during the period November 13 through November 17, 2000. Several of the participants are Park employees very familiar with the area. Their data analysis and prescriptive conclusions are described in the aforesaid Plan.

2. Has consultation with all affected agencies or tribes been completed?

Yes. Consultations have been conducted with affected agencies. Refer to Section E.

G. NATIONAL HISTORIC PRESERVATION ACT DOCUMENTATION

	Yes	No	Data Needed to Determine
Ground Disturbance:			
None. (No ground disturbance associated with project.)	X		
Ground disturbance will occur and an archeologist survey, required under section 110 of the NHPA, will be prepared.		X	
NHPA Clearance form:			
Is required because the project may affect sites that are eligible for or listed on the National Register.		X	
The Virginia SHPO has been consulted.	X		
Is not required because the BAER plan has no potential to affect cultural resources.	X		
(RLB initials of the Cultural Resource Specialist)			

H. OTHER REQUIREMENTS

Does the BAER Plan have potential to affect any Native American Uses? If so, consultation with affiliated tribes is needed.		X	
Are any toxic chemicals, including pesticides or treated wood, proposed for use? If so, local agency integrated pest management specialists must be consulted.	X		
Note: Request for approval of specific herbicides will be processed as appropriate.			

Appropriate attachments:

_X_ map(s) – see BAER Plan

____ site visit notes

_X_ agency consultation – as above

_X_ relevant data or reports – see BAER Plan

_X_ categorical exclusion form

Categorical Exclusion Form

Project: Shenandoah Complex Burned Area Emergency Rehabilitation Plan **Date:** November 20, 2000

Describe project, including location (reference the attached Environmental Screening Form, if appropriate):

Refer to the location descriptions found in the attached Environmental Compliance document, Section F, and the attached *Shenandoah Complex Burned Area Emergency Rehabilitation Plan.*

Describe the category used to exclude action from further NEPA analysis and indicate the number of the category (see Section 3-4 of NPS-12):

See Section C of the attached Environmental Compliance document.

Describe any public or agency involvement effort conducted (reference the attached ESF):

The Plan is a cooperative effort of Shenandoah National Park, NPS-Burned Area Emergency Rehabilitation Team (personnel from USDI-National Park Service, USDI-Bureau of Indian Affairs, USDA-Forest Service, and the Confederated Tribes of Warm Springs, Oregon), and NPS-Northeast Region fire staff. Technical expertise has been drawn upon from each of these agencies plus others as listed in Section E of the attached Environmental Compliance document.

On the basis of the environmental impact information in the statutory compliance file, with which I am familiar, I am categorically excluding the described project from further NEPA analysis. No exceptional circumstances (e.g., all boxes in the ESF are marked "No") or conditions in section 3-6 apply, and the action is fully described in section 3-4 of NPS-12.

Prepared By:

Environmental Compliance Coordinator — Date: 11-17-2000

Concurred By:

Section 106, NHPA, Coordinator — Date: 11.17.2000

Approved By:

(✓) I concur and it is my decision to approve the Plan.
( ) I do not concur.

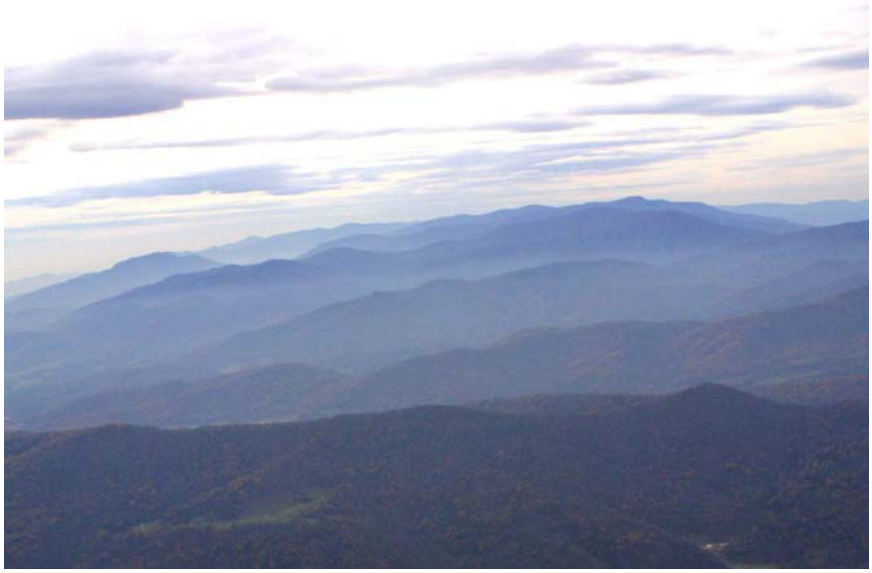
I concur w/ the above compliance.
Acting Chief, NCR Thomas L Thorn

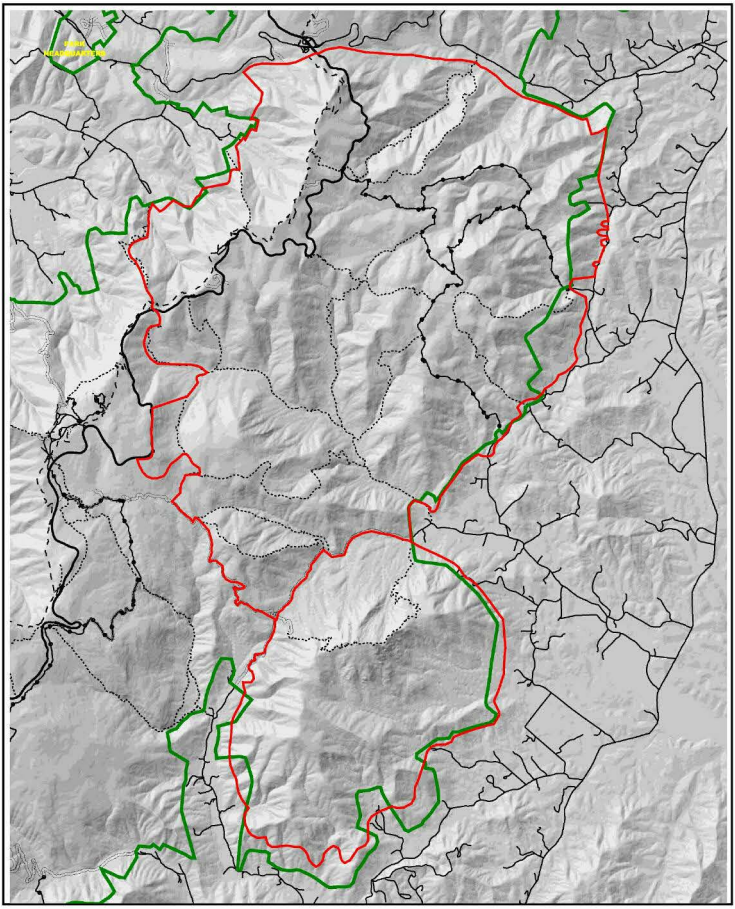
Shenandoah National Park Superintendent — Date: 11/17/00

James Åkerson	SNP NEPA Coordinator
NPS Contact Person	Title
Shenandoah National Park, 3655 US Hwy 211-E, Luray, VA 22835	540-999-3496
Address	Phone number

APPENDIX III. MAPS

- SHADED RELIEF
- FIRE PROGRESSION
- RAPIDAN ROAD FIRE
- SUPPRESSION IMPACTS AND TREATMENTS
- OWNERSHIP
- BURN SEVERITY
- PRE-FIRE VEGETATION
- VEGETATION TREATMENT
- VEGETATION MONITORING AREAS
- PERMANENT VEGETATION MONITORING AREAS
- SENSITIVE NATURAL AREAS





Locator Map



Map Scale 1:60000

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.5 0 0.5 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927
Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

The data represented in the map were gathered from multiple sources which may vary in accuracy, scale and date. This map is for display purposes only.

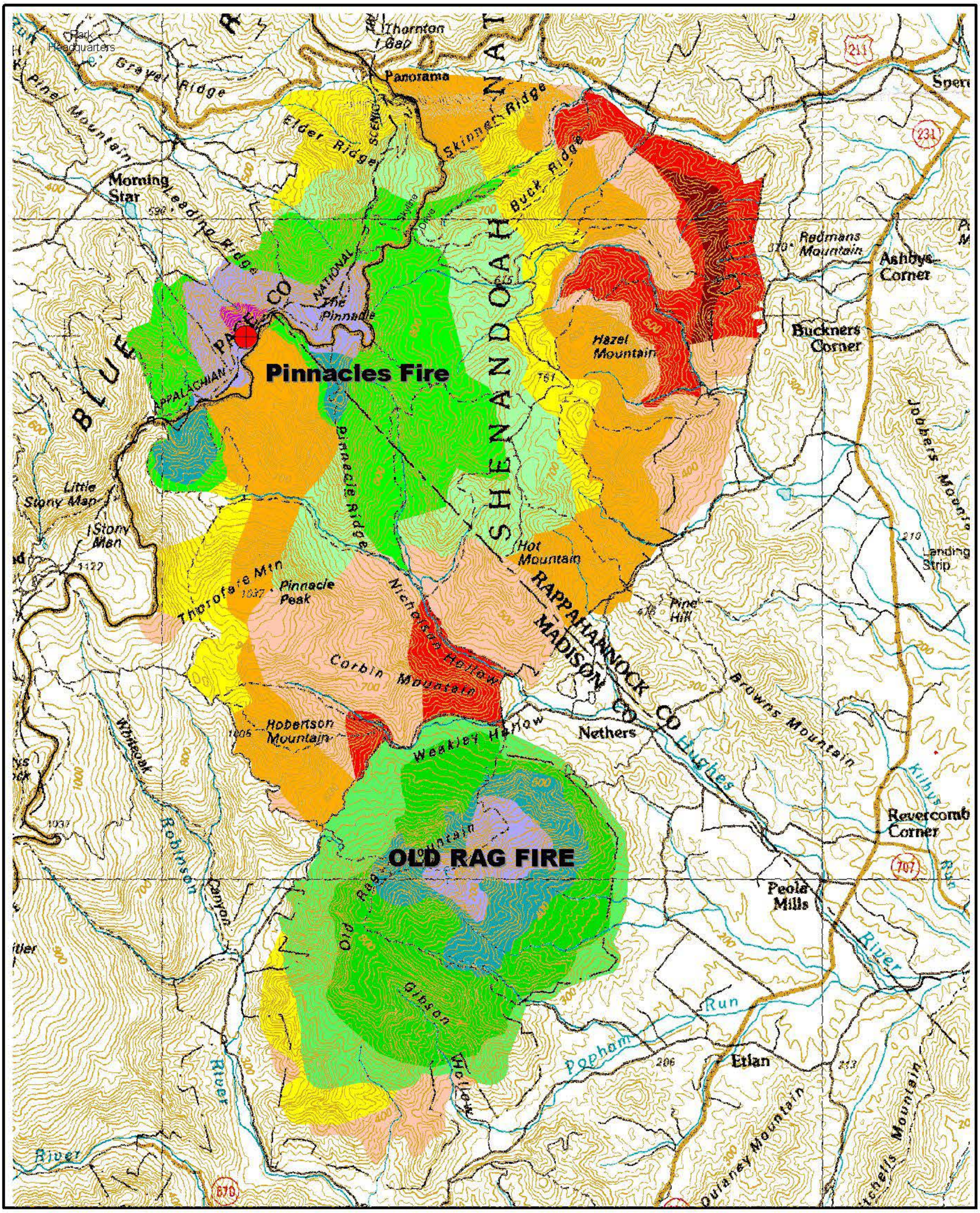
SHADED RELIEF

LEGEND

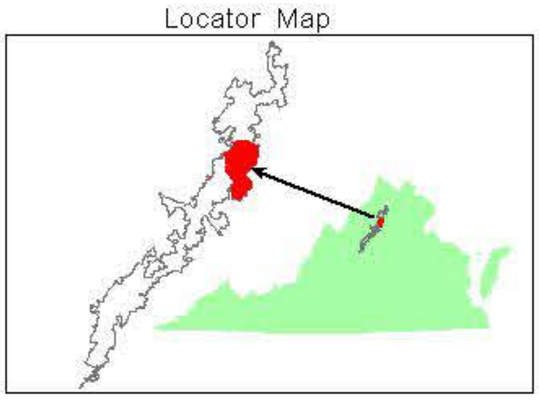
- Fire perimeter
- Park boundary
- Roads
  - State, county
  - Fire road
  - Skyline Drive
- Trails
  - Appalachian trail
  - Foot trail
  - Horse trail

SHADED RELIEF

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan



Locator Map



Map Scale 1:60,000

Contour Interval 20 Meters

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

LEGEND

Fire Progression 10/30-11/08

67	AC	10/30/2000	14:00 Hrs
1318	AC	10/31/2000	14:00 Hrs
2534	AC	11/01/2000	18:00 Hrs
7921	AC	11/02/2000	18:00 Hrs
11668	AC	11/03/2000	18:00 Hrs
14300	AC	11/04/2000	18:00 Hrs
18405	AC	11/05/2000	18:00 Hrs
22152	AC	11/06/2000	18:00 Hrs
23941	AC	11/07/2000	18:00 Hrs
24197	AC	11/08/2000	18:00 Hrs

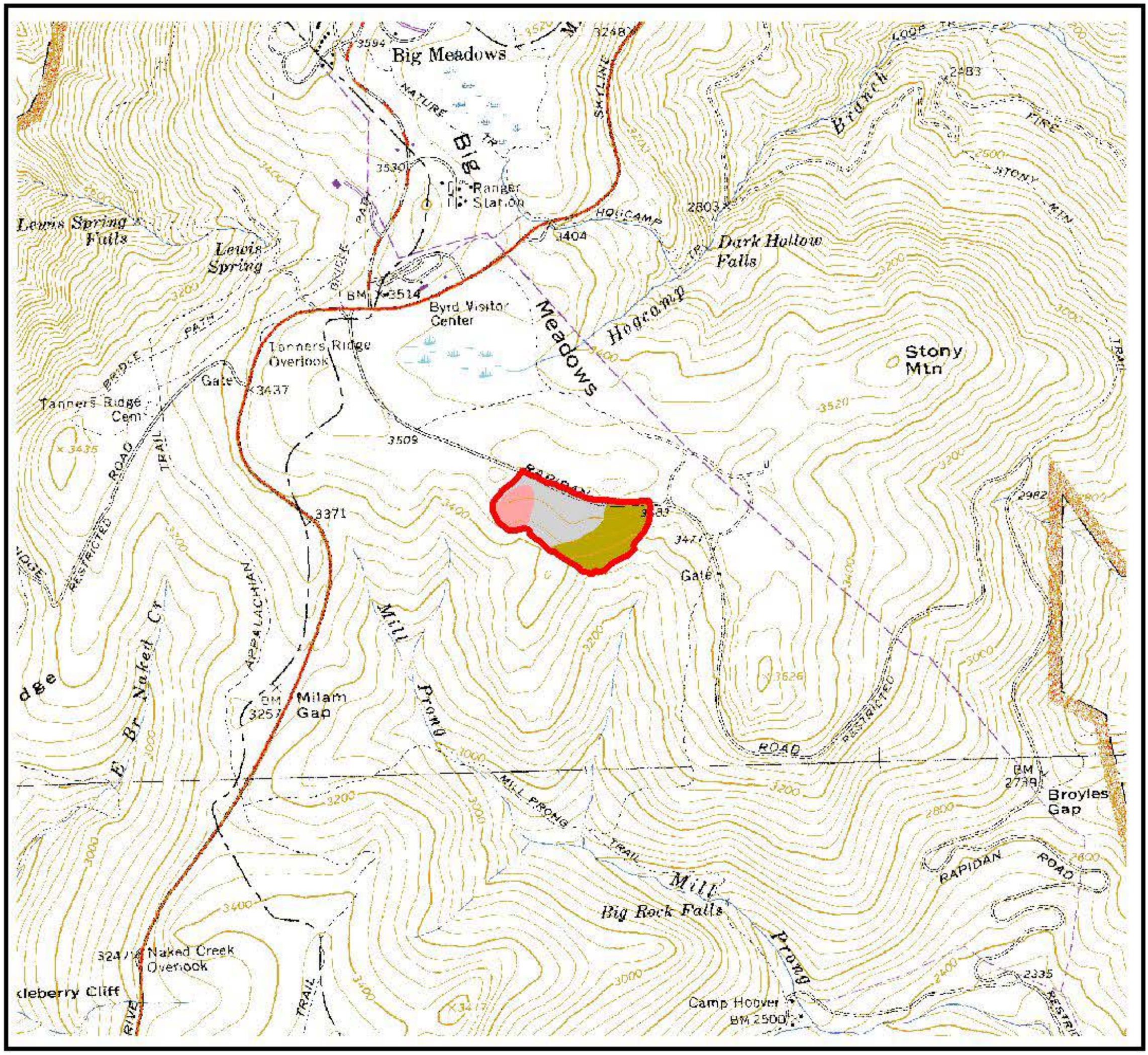
Point of Origin

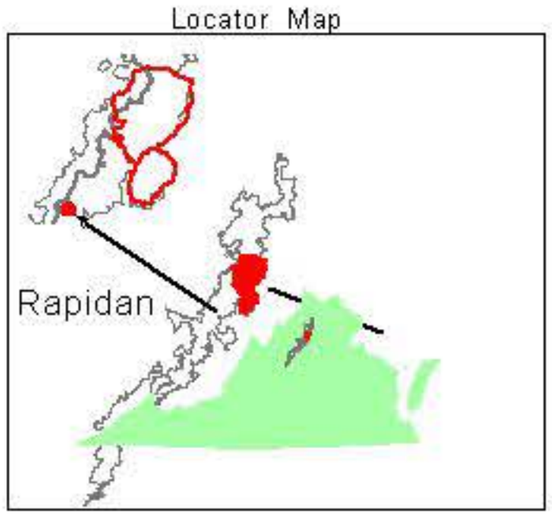
FIRE PROGRESSION

The data represented in the map were gathered from multiple sources which may vary in accuracy, scale and date. This map is for display purposes only.

FIRE PROGRESSION

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan





Map Scale 1:24,000

Contour Interval 40 Feet

2000 0 2000 Feet

0.4 0 0.4 Miles

0.3 0 0.3 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

LEGEND

Pre-fire Vegetation

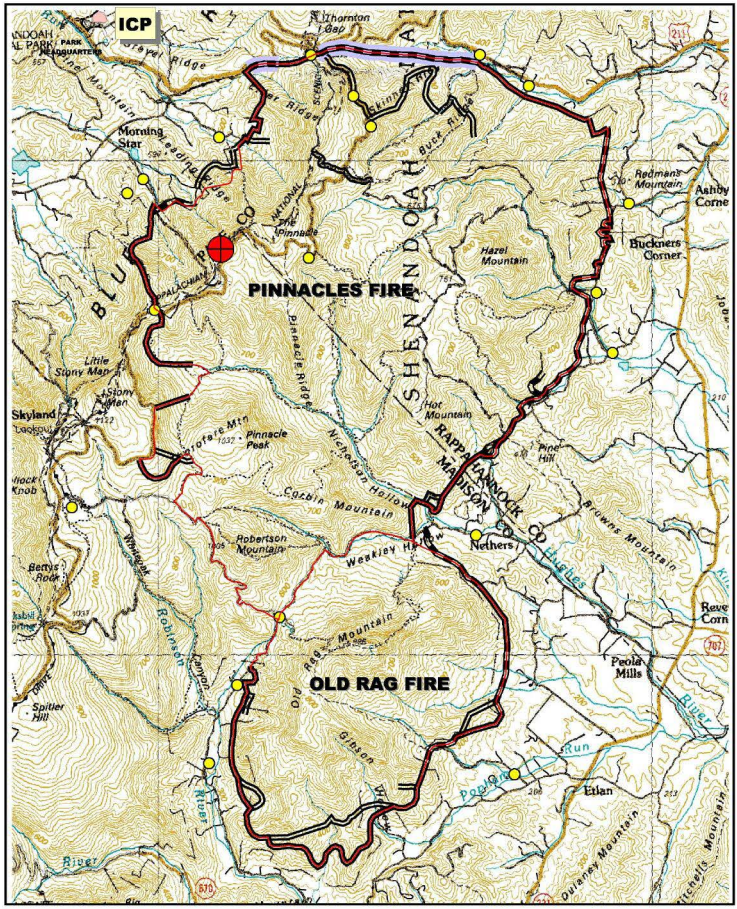
- Black Locust
- Cove Hardwood
- Red Oak
- Fire Perimeter

Rapidan Road Fire 25 acres

The data represented in the map were gathered from multiple sources which may vary in accuracy, scale and date. This map is for display purposes only.

RAPIDAN ROAD FIRE

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan



Locator Map



Map Scale 1:60000
Contour interval 20 meters

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927
Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

The data represented in the map were gathered from multiple sources which may vary in accuracy, scale and date. This map is for display purposes only.

LEGEND

- Fire perimeter
- Point of origin

IMPACTS

- Handline
- Dozerline
- Drop point

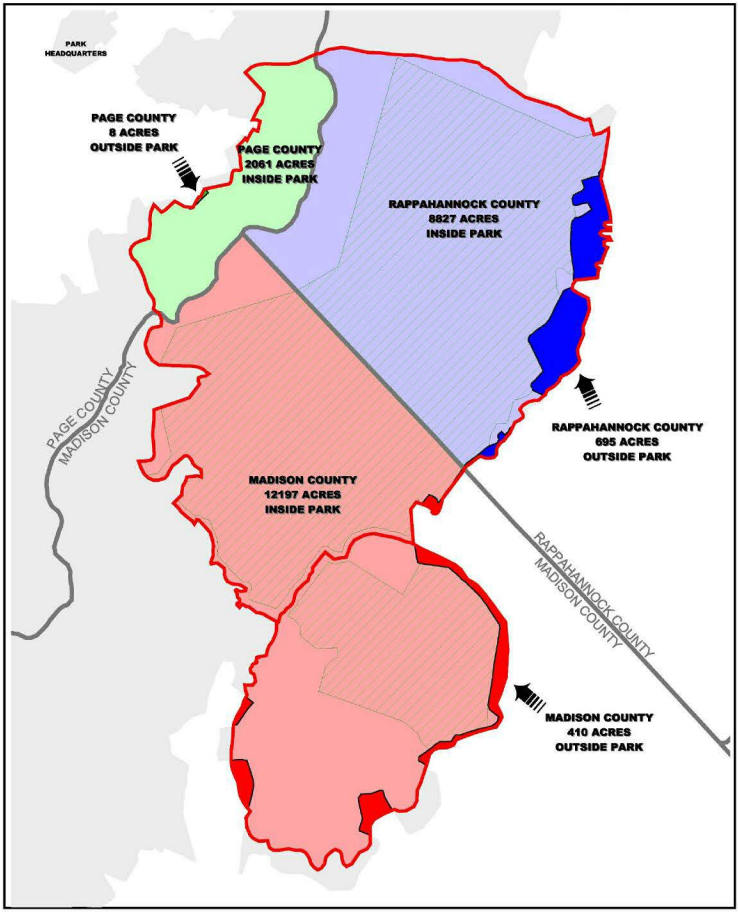
TREATMENTS

- Construct rolling dips
- Aerate

SUPPRESSION IMPACTS AND TREATMENTS

SUPPRESSION IMPACTS AND TREATMENTS

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan



Locator Map



Map Scale 1:60000

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.5 0 0.5 1 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927
Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

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LEGEND

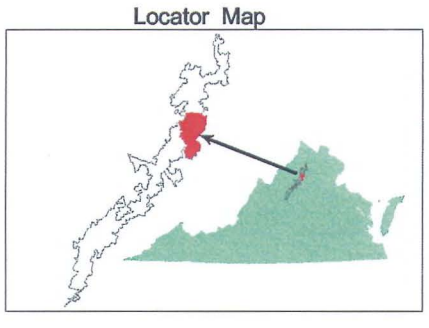
- Fire perimeter
- Shenandoah National Park
- Madison County (inside park) - 12197 acres
- Madison County (outside park) - 410 acres
- Page County (inside park) - 2061 acres
- Page County (outside park) - 8 acres
- Rappahannock County (inside park) - 8827 acres
- Rappahannock County (outside park) - 695 acres
- Wilderness (burned) - 14829 acres

OWNERSHIP

OWNERSHIP

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan

Locator Map



N
W E
S

Contour Interval 20 Meters

Map Scale 1:60,000

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

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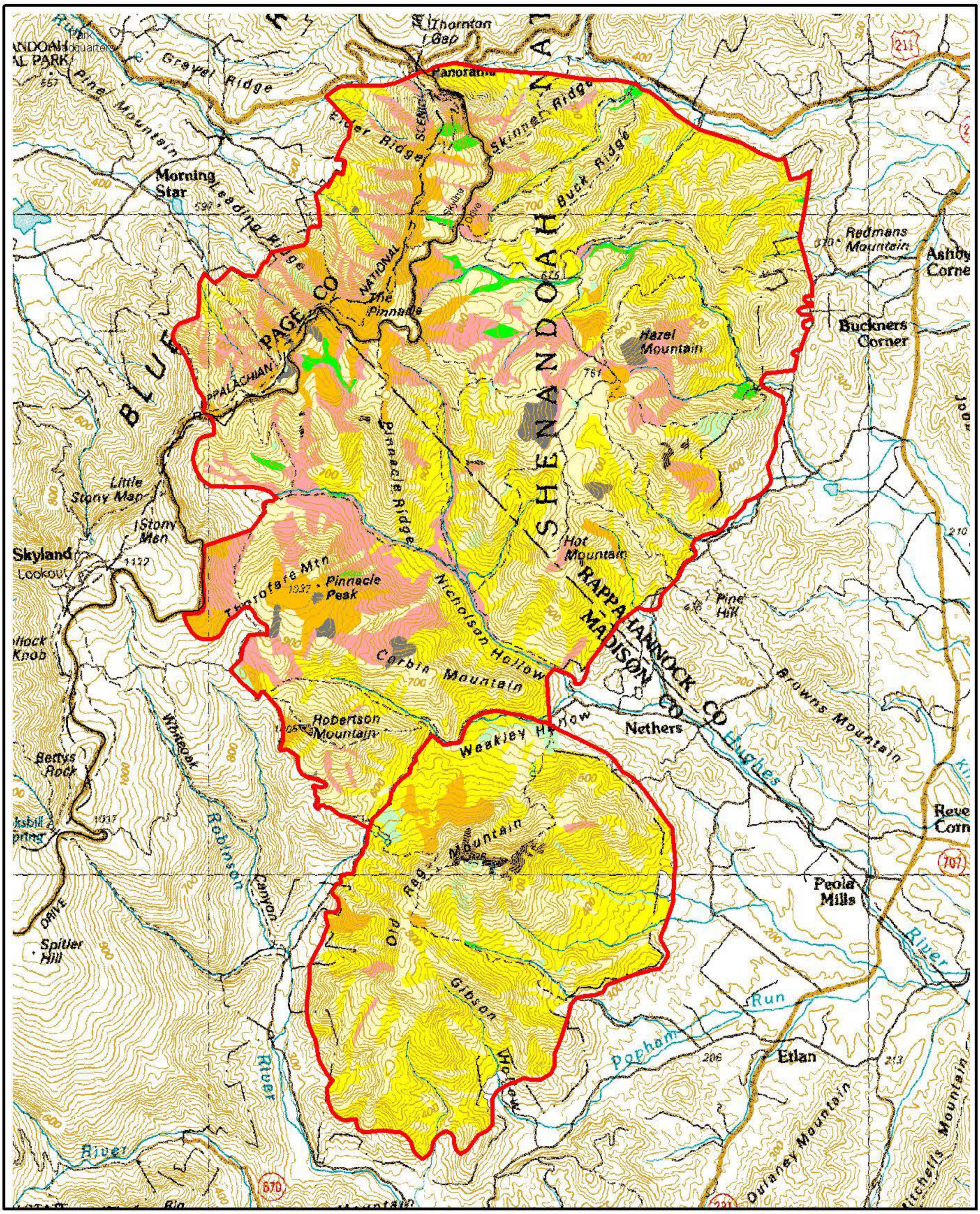
LEGEND

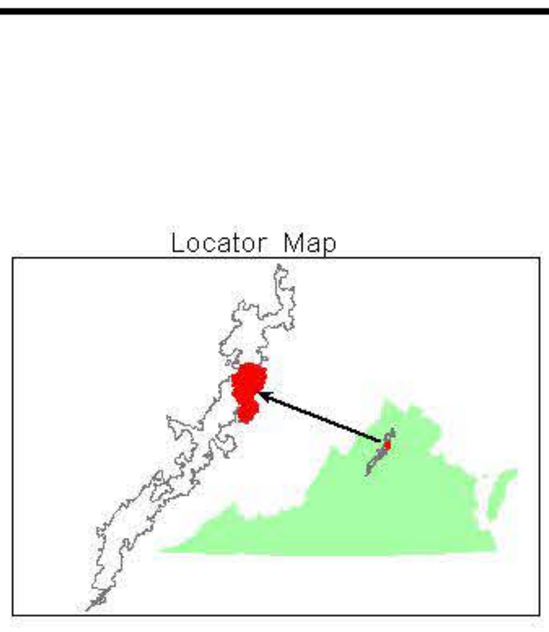
- Burn Severity (Entire fire is Low)
- Fire Perimeter
- Skyline Drive

BURN SEVERITY

BURN SEVERITY

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan





N
W BAER E
S

Map Scale 1:60,000

Contour Interval 20 Meters

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

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LEGEND

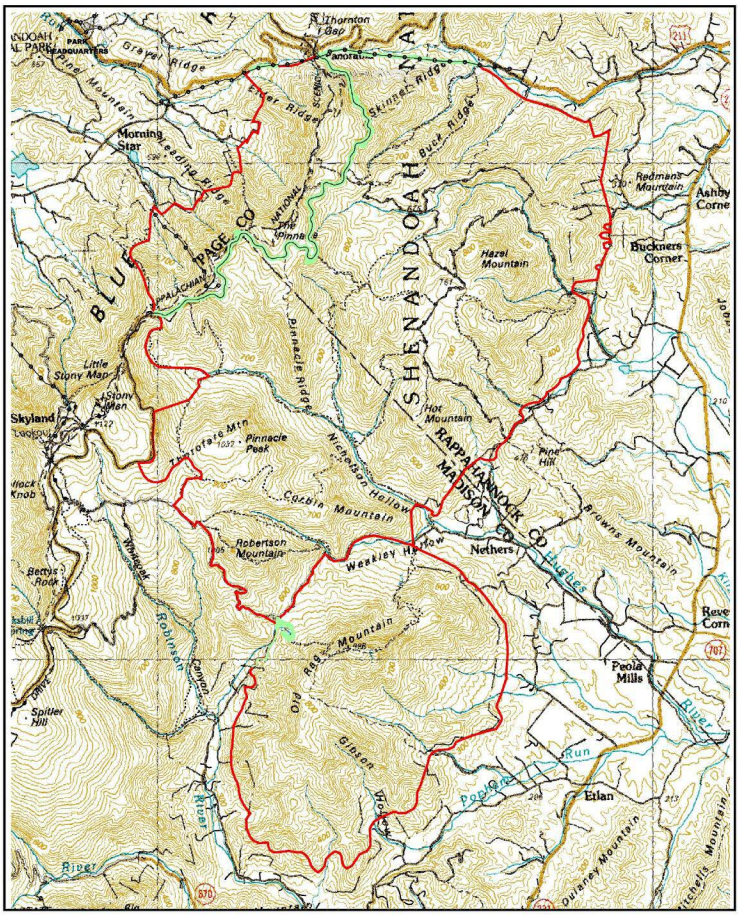
Pre-Fire Vegetation

- Fire Perimeter
- Chestnut Oak
- Red Oak
- Black Locust
- Cove Hardwood
- Yellow Poplar
- Hemlock
- Pine
- Rock
- Other

PRE-FIRE VEGETATION

PRE-FIRE VEGETATION

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan





Map Scale 1:60000
Contour interval 20 meters

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

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LEGEND

Fire perimeter

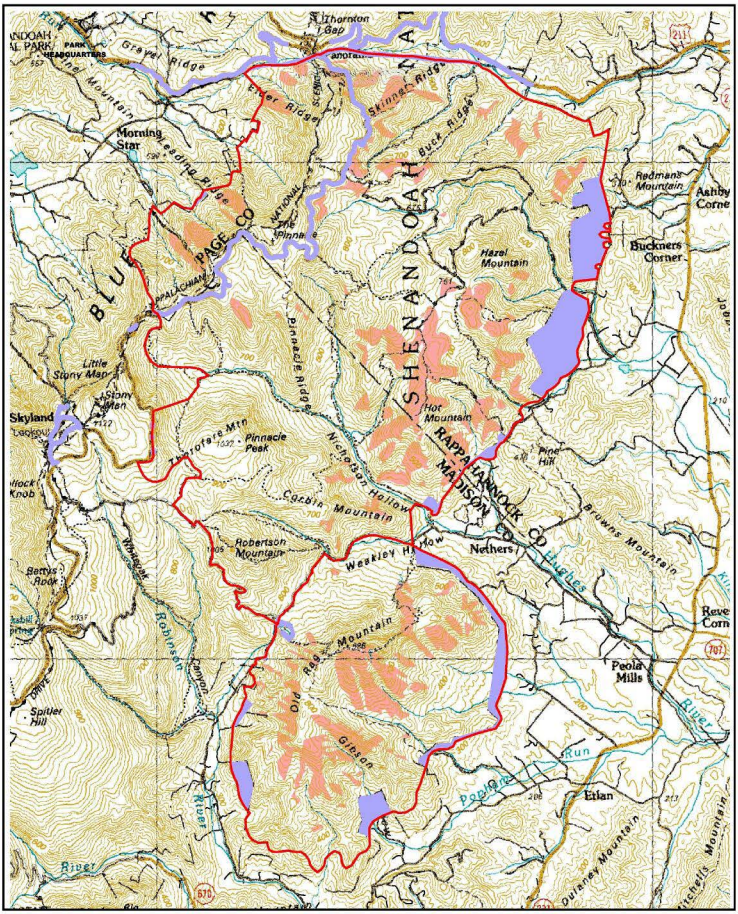
TREATMENT

Native grass seeding

VEGETATION TREATMENT

VEGETATION TREATMENT

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan



Locator Map



Map Scale 1:50000
Contour interval 20 meters

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
3655 US Highway 211 E
Luray, Virginia 22835

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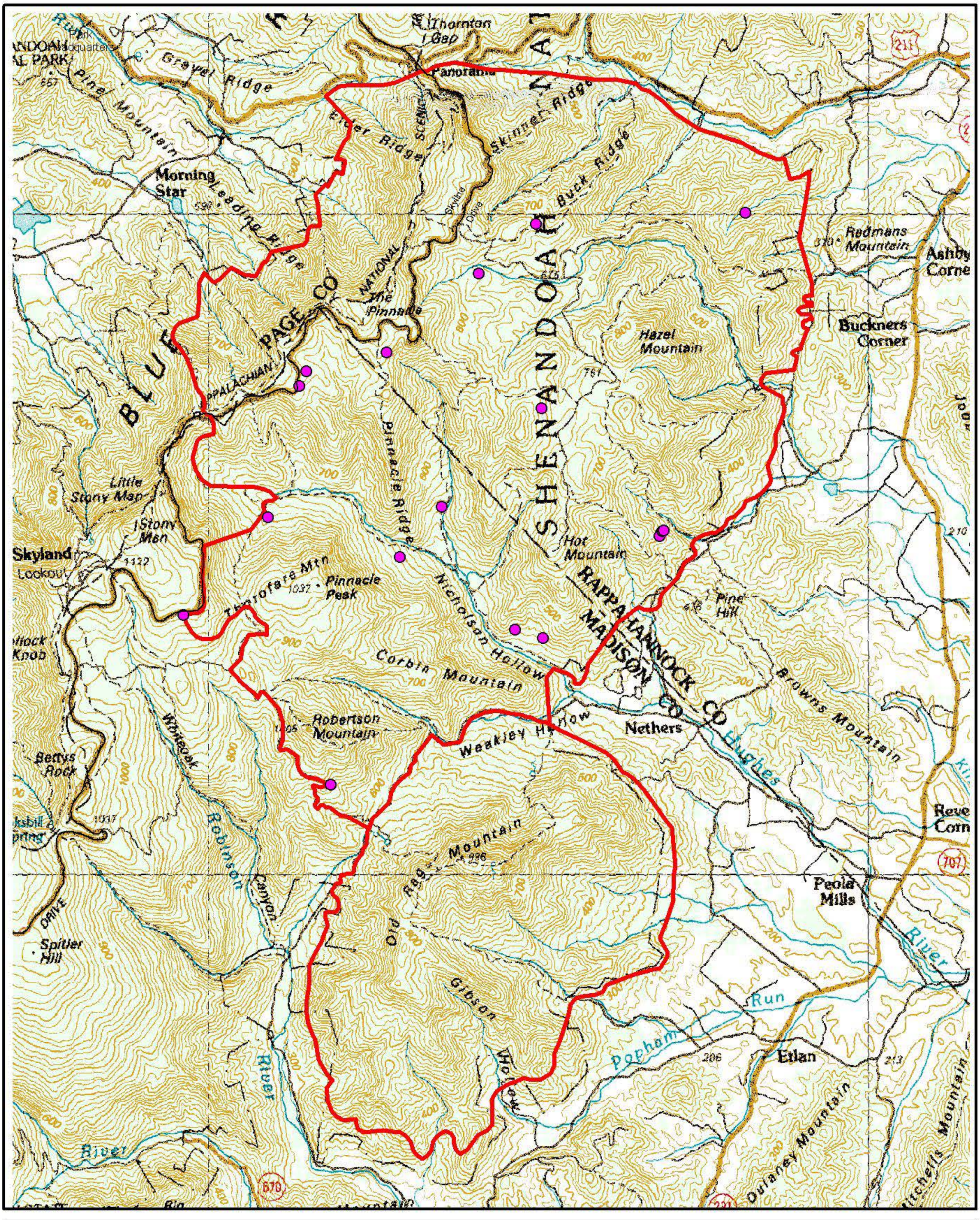
LEGEND

- Fire perimeter
- Heavy Gypsy Moth defoliation
- Invasive plants

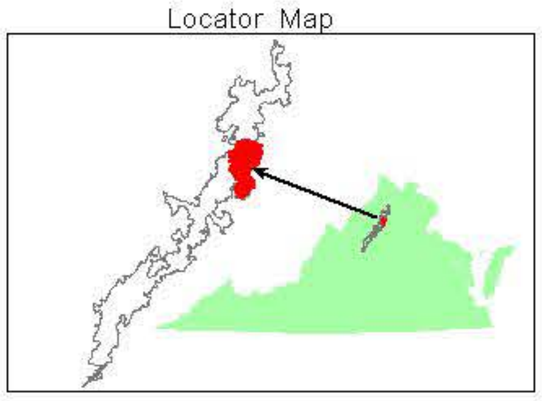
VEGETATION MONITORING AREAS

VEGETATION MONITORING AREAS

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan



Locator Map



Map Scale 1:60,000

Contour Interval 20 Meters

5000 0 5000 10000 Feet

1 0 1 2 Miles

0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
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Luray, Virginia 22835

LEGEND

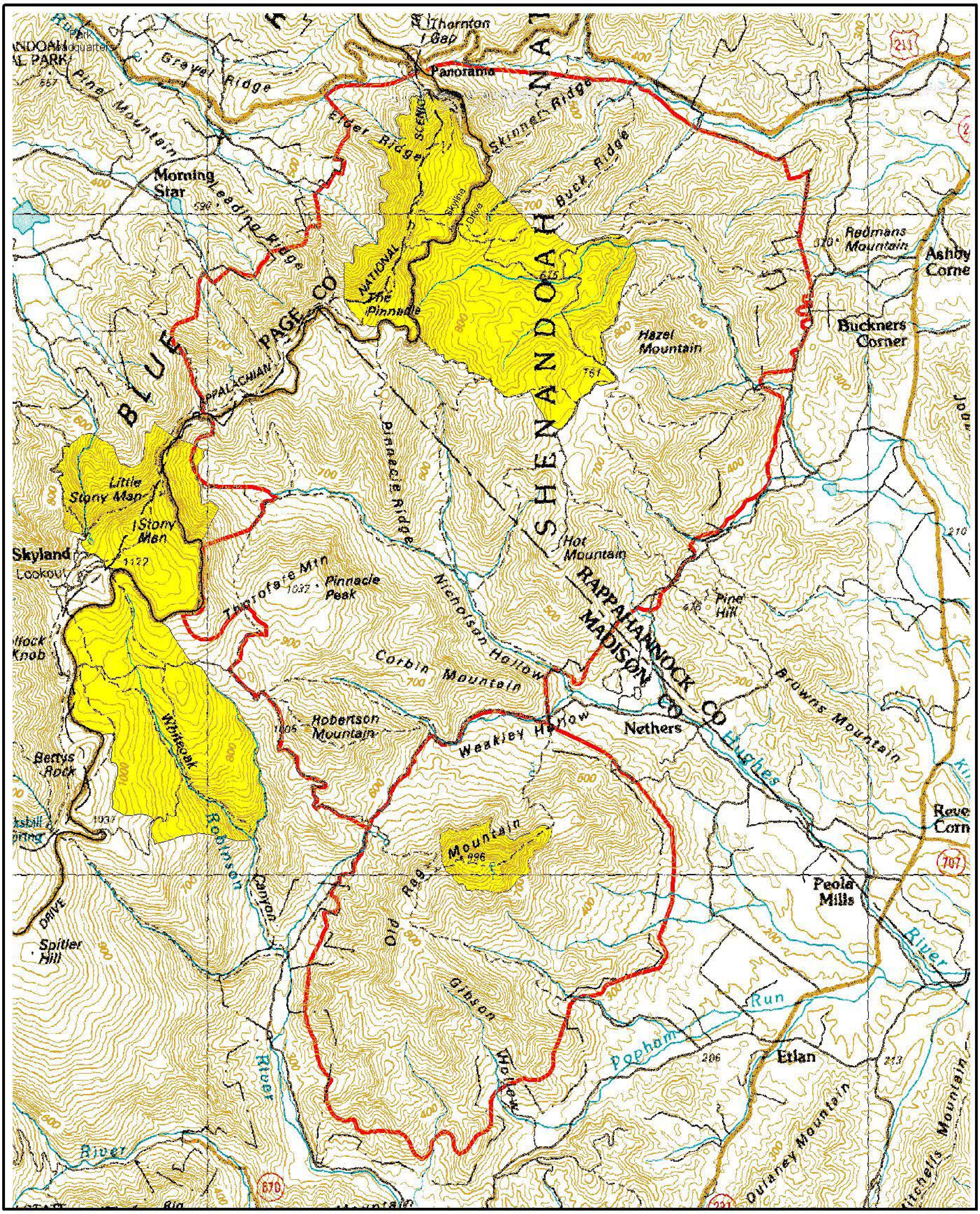
- 18 Vegetation Monitoring Areas
- Fire Perimeter
- Skyline Drive

PERMANENT VEGETATION MONITORING AREAS

The data represented in the map were gathered from multiple sources which may vary in accuracy, scale and date. This map is for display purposes only.

PERMANENT VEGETATION MONITORING AREAS

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan



Map Scale 1:60,000

Contour Interval 20 Meters

5000 0 5000 10000 Feet

1 0 1 2 Miles

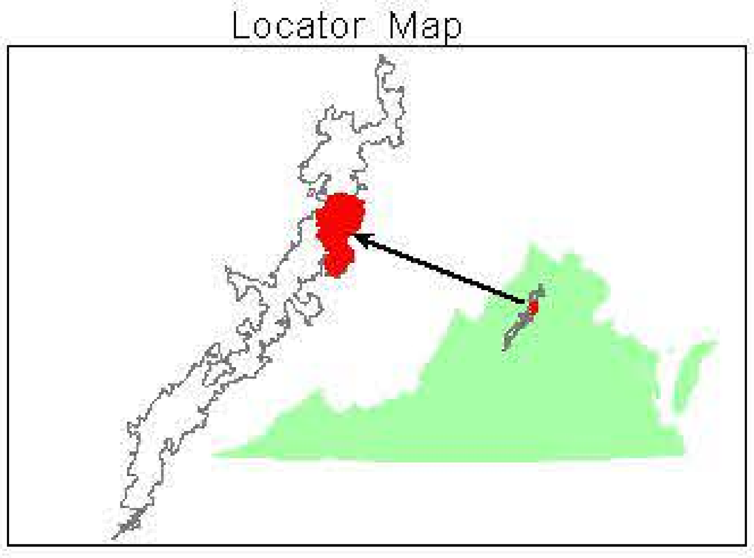
0.8 0 0.8 1.6 Kilometers

Nov-16-2000

Universal Transverse Mercator projection
Zone 17, North American Datum of 1927

Shenandoah National Park GIS
3655 US Highway 211 E.
Luray, Virginia 22835

Locator Map



LEGEND

- Sensitive Natural Areas
- Fire Perimeter
- Skyline Drive

The data represented in the map were gathered from multiple sources which may vary in accuracy, scale and date. This map is for display purposes only.

SENSITIVE NATURAL AREAS

Shenandoah Burned Area Emergency Rehabilitation (BAER) Plan

SENSITIVE NATURAL AREAS

APPENDIX IV. PHOTO DOCUMENTATION



FIRE SUPPRESSION













FIRE ACTIVITIES













FIRE EFFECTS





RAPIDAN ROAD FIRE









CULTURAL RESOURCES







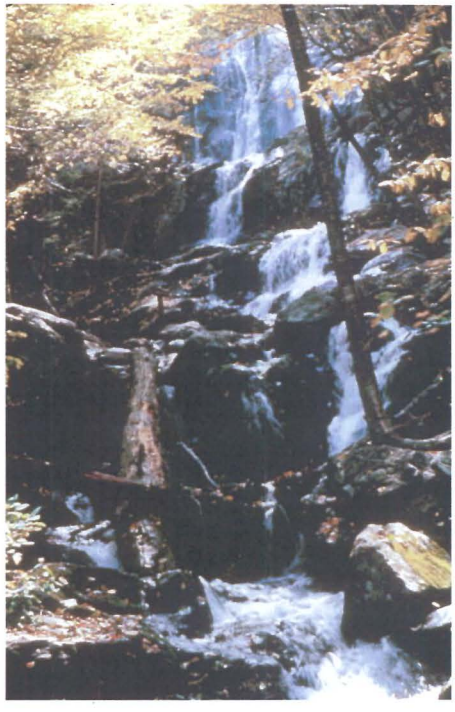






NATURAL RESOURCES









SHENANDOAH SALAMANDER

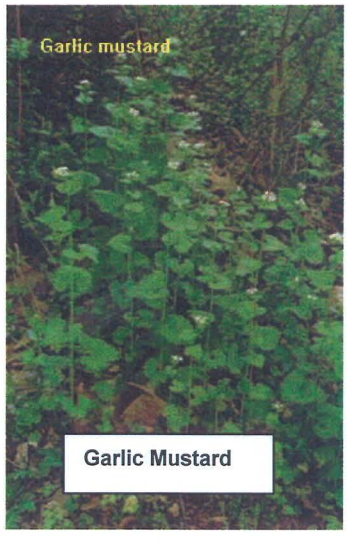




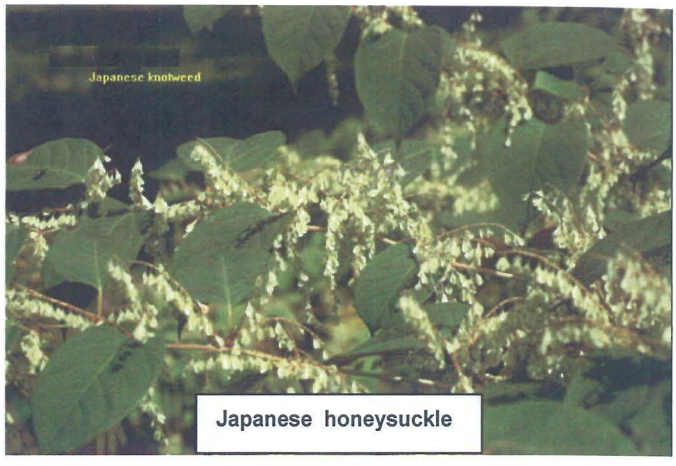
NON-NATIVE INVASIVE PLANTS



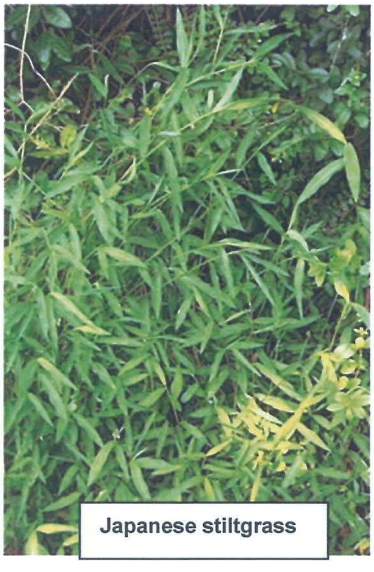
Gill-over-the-ground



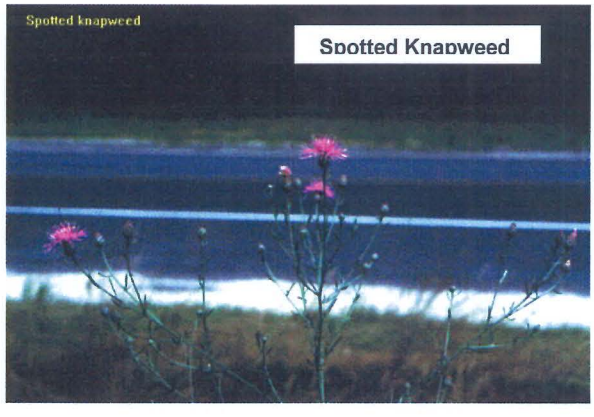
Garlic Mustard



Japanese honeysuckle



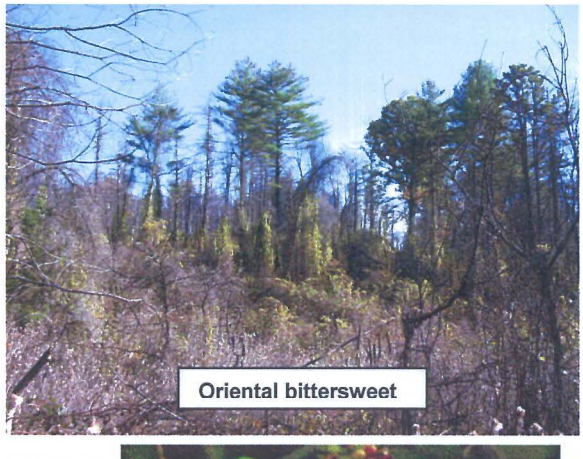
Japanese stiltgrass



Spotted Knapweed



Mullein

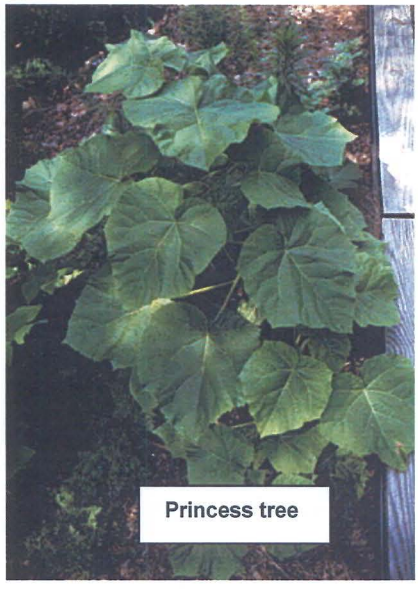


Oriental bittersweet

GYPSY MOTH CATERPILLAR







Princess tree

APPENDIX V. SUPPORTING DOCUMENTS

- **Invasive Vegetation**
- **BAER Team Extension Request**
- **Delegation of Authority**
- **Post-Fire Site Inspection Record**
- **NPS News Release (BAER Team)**
- **Hazard Tree Evaluation Memo**
- **Invasive Species Web Reference List**
- **NPS News Release, Media Briefing Alert**
- **Hiker Trail Sign (2)**
- **"Fire Summary and Tips for Trail Overseers"**
- **Fire Hiking Trail Summary**
- **BAER Plan Printing Quote**



Invasive Vegetation

Invasive non-native vegetation is present in several locations in and around the fire area. These pose high risk of explosive spread and colonization in forest areas of open understories with previously compromised tree overstories.

Species detected during the BAER field reconnaissance include:

- Oriental bittersweet (*Celastrus orbiculatus*),
- Japanese honeysuckle (*Lonicera japonica*),
- Mullein (*Verbascum spp.*),
- Princess tree (*Paulownia tomentosa*),
- Tree of heaven (*Ailanthus altissima*),
- Japanese stiltgrass (*Microstegium vimineum*),
- Spotted knapweed (*Cetaurea maculosa*),
- Gill-over–the-ground (*Glechoma hederaceae*), and
- Garlic mustard (*Alliaria petiolata*).

Recommendations include monitoring and suppression activities. Twice-yearly monitoring of forest openings is needed to capture spring and summer emergents. Targeted openings include Skyline Drive and its five overlooks, the Luray-to-Sperryville powerline right-of-way, access roads and trails, and broken forest stands previously impacted by gypsy moth epidemic (1985-1995). Suppression would follow the twice-annual inspections. Recommended methods include hand pulling, manual cutting and basal application of herbicides, and foliar herbicide applications.

United States Department of the Interior

NATIONAL PARK SERVICE
Shenandoah National Park
3655 U.S. Hwy. 211 E
Luray, Virginia 22835-9036

IN REPLY REFER TO:

November 13, 2000

Memorandum

To: Regional Fire Management Officer, Northeast Region, National Park Service

From: Superintendent, Shenandoah National Park

Subject: Extension Request of Due Date for Burned Area Emergency Rehabilitation Plan for the Shenandoah Fire Complex, Shenandoah National Park

The Shenandoah Fire Complex was ignited on October 29 and 30, 2000. The fires were contained at approximately 24,000 acres and contained on November 12, 2000.

On November 7, 2000, the park contacted Burned Area Emergency Rehabilitation (BAER) Team Leader, Erv Gasser for assistance. It was determined that the team was needed because of the varied issues that were identified: watershed stabilization to protect archeological sites, weed invasions; cultural resource damage, hazard trees, and threatened, endangered, and special interest species. A request for the team was made on November 9 and team members arrived at the park on November 12, and began to conduct their assessments.

Since the fire was declared controlled on November 13, and the BAER Team did not arrive until November 12, it is not possible to meet the requirement of submitting the BAER Plan within five days of control of the fire. Therefore, we request an extension be granted for the completion of the plan by November 23, 2000.

Should you have any questions regarding this request please contact Erv Gasser, BAER Team Leader, at 540-999-3439.

Constance Rudal

for Douglas K. Morris

Author: Doug Wallner at NP-MARO
Date: 11/16/2000 10:14 AM
Normal
Receipt Requested
TO: Paul Head at NP-NARO, Sue Imler at NP-SHEN
CC: Doug Raeburn at NP-SHEN
TO: Erv Gasser at NP-PNRO
Subject: Re[2]: BAER TEam message from Wallner
---------- Message Contents ----------

Paul, Thanks, that's how I felt but wanted to make sure that you concurred,

Doug

_____Reply Separator_____
Subject: Re: BAER TEam message from Wallner
Author: Paul Head
Date: 11/15/00 8:07 PM

Doug,
As per NPS RM-18, Regional Offices will review the BAER plan within specific timeframes. As the Regional Prescribed Fire Specialist, You have the authority to approve the plan.
Paul

_____ Reply Separator _____
Subject: BAER TEam message from Wallner
Author: Sue Imler at NP-SHEN
Date: 11/15/00 10:18 AM

Paul,

My ccmail isn't working so I'm using SHEN's.

I've spent the last few days at SHEN with the BAER team. Do you want to delegate regional review authority to me? RM-18 states that regional offices review and may approve projects up to $300K, but does not specify who is responsible.

There is a BAER component in my PD. With you being out of the office until the end of the week, I'm willing to take the lead on review of the plan. There are tight time frames associated with BAER. The plan/proposal has to be completed within 5 days of the control date (they've requested until turkey day, 11/23. Regional Offices have 7 days to respond.

I plan on being on the close out, tentatively planned for Monday 11/20.

I'm heading home today (Wed) Give me a call so we can discuss this either at work or home.

Doug Wallner

November 16, 2000

Memorandum

To: Superintendent, Shenandoah National Park

From: Prescribed Fire Specialist, Northeast Region

Subject: Extension of Due Date for Burned Area Emergency Rehabilitation Plan for the Shenandoah Fire Complex

Recognizing that the fire was declared controlled on November 13, and the BAER Team did not arrive until November 12, I concur that it is not possible to meet the requirement of submitting the BAER Plan within five days of control of the fire. Your request for an extension to November 23, 2000 is granted for the completion of the plan

I plan on attending the closeout meeting with the team upon their departure.

Should you have any questions please contact me at (215) 597-7140.

Doug Wallner

Memorandum

DATE:	November 1, 2000
TO:	Incident Commander Joe Stutler
FROM:	Superintendent, Shenandoah National Park
RE:	Delegation of Authority, Shenandoah Complex Wildland Fires
CC:	Incident File

Effective November 1, 2000, at __0800__hours I have delegated the authority to manage the Rapidan Road, Pinnacles, and Old Rag Fires, hereafter referred to as the Shenandoah Complex, and any subsequent initial attack fires that may occur within the boundaries of Shenandoah National Park, to Incident Commander Joe Stutler and his Incident Management Team.

The Pinnacles and Rapidan Road fires began at approximately 1400 on October 29, 2000, and the Old Rag fire at approximately 1800 on October 30, 2000. A portion of the Pinnacles fire is expected to burn into legislated wilderness. The Old Rag Fire is presently burning within designated wilderness. My considerations for the management of these fires are:

1. Provide for fire fighter and visitor safety.
2. Minimize resource impacts by utilizing minimum impact suppression techniques.
3. Chainsaws, leafblowers, mechanized pumps, and aircraft may be used within the park and in designated wilderness areas during suppression activities. The use of bulldozers and tractor plows is generally prohibited, but may be considered for use upon emergency request detailing extreme threats to life and or property. In addition, input from the designated Resource Advisor will be considered when making a request of this type.
4. Manage the fire in a cost effective manner with due consideration for the values at risk.
5. My Line Officer Representative will be Park Fire Management Officer Doug Raeburn. He will be available to the team throughout the duration of the of the incident.
6. My Resource Advisor will be Wendy Cass . She will communicate directly to the team through the Line Officer Representative.
7. Manage the fire with minimum disruption to visitor access and park operations consistent with public safety. Special attention should be paid to the Skyline Drive, the Appalachian Trail, and any historic structures that may be threatened by the fire.
8. Keep the fire contained to park lands. Provide reasonable advance notice to the Virginia Department of Forestry and park neighbors if the fire is expected to threaten those areas.
9. Provide training opportunities for the personnel of Shenandoah National Park so as to strengthen our organizational capabilities.
10. Prepare a list to be used in developing letters of appreciation for any cooperative agencies and their personnel that may have been involved in the incident.
11. Release park resources as soon as possible, so that they may be made available for initial attack and other park operations. Identify in your Incident Action Plan resources that will be made available to assist in the event of new fire starts in the park.
12. Prepare a final fire documentation package, including a fire narrative, maps, evaluations, analysis, and fiscal documentation.

Superintendent_____ Date_____

Incident Commander _____ Date _____

Attach completed form, map(s) and photo log to Site Form Comments on Back of form Yes___ No___

SHENANDOAH FIRE COMPLEX EMERGENCY POST-FIRE SITE INSPECTION RECORD

SITE: No: _____ Temp or other No: _____ Date of Inspection _____
Inspector(s) initials _____ Crew Chief _____

SITE DESCRIPTION
Site Type: Prehistoric Historic Multi component Other _____
UTM (GPS) Z12_____ -E _____ -N Elev: _____ USGS Quad: _____
Features Present: _____
_____
_____
List wood/organics (if known to be present): _____
Were they burned Y _____ *N* _____

VANDALISM PRESENT: YES_____ NO _____ If yes, Recent YES_____ NO_____ UNKNOWN_____

SITE BURN SEVERITY
_____Low (duff partially consumed, none to little ladder fuels burned, no canopy burned)
_____ Moderate (duff consumed, ladder fuel burned, isolated crown bum or torching)
_____ Severe (duff, ladder and crown completely consumed)
Note: Map, photograph and describe affected areas of site

FIRE EFFECTS AT SITE	**YES**	**NO**
Cracking/spalling	_____	_____
Smoke/soot damage.	_____	_____
Stump/root holes	_____	_____
Loss of architectural wood/features	_____	_____
Tree(s) on walls or rubble	_____	_____

Other _____
_____

SUPPRESSION IMPACTS TO SITE: YES___ NO___ Handline ____ Drop point/safety zone____
Dozer line____ Retardant drop impact/staining____ Mopup ____ Tree falling ____ Spike Camp ____
Safety Zone_____ Vegetation removal ____ Vehicle ruts _____
Other _____

EROSIONAL THREATS-TO SITE: YES_____ NO _____
On site slope _____ % Aspect _____o
Site Watershed (to 20 m. out) Slope _____% Aspect _____o
Erosion threat: Active gully/rilling/scouring (depth and extent)_____
Stumphole/burned log erosion _____ Pedestaling _____ Duff absent _____
Other _____
_____

RECOMMENDED PRESERVATION TREATMENT
_____ No Treatment Recommended
_____ Monitor (Treatment specific)
_____ Treatment Recommended: if so, describe:(e.g. Directional falling, Straw bale, straw scatter, Excelsior matting, sandbag, etc.):
_____
_____
_____

Additional comments on back Yes____ No _____ 11/15/00

NEWS RELEASE

u.s. department of the interior

national park service

For Immediate Release

For additional information contact
Lyn Rothgeb @ 540/999-3311

BURNED AREA EMERGENCY REHABILITATION (BAER) TEAM BEGINS WORK ON SHENANDOAH FIRE COMPLEX

Shenandoah National Park, VA—A team of specialists from the Department of the Interior arrived on the Shenandoah Fire Complex and began fire assessments on Monday, November 13, 2000. This Burned Area Emergency Rehabilitation (BAER) team will measure fire suppression impacts and fire effects on both cultural and natural resources, and will recommend any needed rehabilitation. (Fire suppression impacts include fire lines [hand and bulldozer lines], safety zones, drop points, and the incident base camp.)

The team consists of 12 specialists, including: 1 hydrologist, 1 soil scientist, 3 archeologists, 1. wildlife biologist, 2 vegetation specialists, 3 geographic information specialists, and 1 environmental protection specialist. BAER team members represent the Bureau of Indian Affairs, National Park Service, and U.S. Forest Service. The team is led by Erv Gasser of the National Park Service.

The BAER team's focus is on the identification of standing dead trees that may have been weakened by fire and are now hazardous; the erosion and runoff potential from loss of vegetation and charred soils; the protection from weed invasion; any possible impacts to threatened, endangered, and sensitive species; and the effect on cultural resources. Following the fire assessment, additional short-term rehabilitation measures will be recommended. (Fire crews have already begun to rehabilitate the hand and bulldozer lines.)

For purposes of the BAER team's review, the Shenandoah Fire Complex consists of the Pinnacles Fire - 18,066 acres; Old Rag Fire - 6,131 acres; and Rapidan Road (Big Meadows) Fire - 52 acres. All fires within the complex are 100% contained.

It's anticipated that the fire assessments will be completed by Thursday, November 16, and the BAER team's plan should be completed by Monday, November 20.

Skyline Drive has been re-opened to the public. Trail access to the burned areas continues to be temporarily restricted for safety reasons and needed rehabilitation work. For the latest information on trail openings, call (540) 999-3397, Monday through Friday 8 a.m. to 4:30 p.m.

* * * * *

Prepared 11/14/2000

Memorandum

November 14, 2000

To: BAER Team: Shenandoah Complex, Shenandoah National Park

From: Steve Bair, SHEN Resource Advisor

Subject: Hazardous Tree Evaluation

During the course of the Shenandoah Complex Fires suppression and rehabilitation efforts, fire-weakened hazard trees adjacent to established trails and administrative roads used as fireline and established trails burned over within the interior of the fire perimeter were identified and dropped by fire crews. Resource Advisors directed the crews in hazard tree mitigation. Most trails within the burn area are located in federally designated Wilderness and "light on the land" techniques were employed: only those fire-weakened trees presenting a serious and immediate threat to trail users were dropped by faller teams. Hazard trees were identified and mitigated along nearly 60 miles of the following trails and administrative roads:

Trails

Appalachian Trail (Thornton Gap to Stony Man Overlook)
Marys Rock Trail
Ridge Trail (Old Rag Mountain)
Saddle Trail (Old Rag Mountain)
Crusher Ridge Trail
Buck Hollow Trail
Buck Ridge Trail
Meadow Spring Trail
Nicholson Hollow Trail
Corbin Cabin Cutoff Trail
Hannah Run Trail
Indian Run Trail
Corbin Mountain Trail
Hazel Mountain Trail
Leading Ridge Trail
Catlett Spur Trail
Catlett Mountain Trail
Sams Ridge Trail
Broad Hollow Trail
Hot-Short Mountain Trail
Corbin Hollow Trail
Robertson Mountain Trail
White Rocks Trail
Hazel River Trail

Pine Hill Gap Trail
Administrative Roads
Weakley Hollow Road
Old Rag Road
Berry Hollow Road

During the fire suppression and rehabilitation efforts, fire-weakened hazard trees were also identified, dropped and removed along nearly 10 miles of the **Skyline Drive** fire area (**milepost 31 to milepost 41**) by faller crews and front end loader. SHEN Resource Advisors directed the Skyline Drive hazard tree mitigation.

On November 14, SHEN Resource Advisors Steve Bair and Shawn Green assessed the Skyline Drive and backcountry facilities to identify further need for fire-weakened hazard tree mitigation. The entire **Skyline Drive, overlooks,** and the **Pinnacles Picnic Area** within the fire area were evaluated and no additional hazard trees were detected. Backcountry shelters **Byrds Nest #1**, **Old Rag Shelter**, and **Byrds Nest #3** were assessed for hazard trees threatening those facilities and the safety of shelter users and none were identified. Resource Advisor Steve Bair had visited the **Corbin Cabin** in Nicholson Hollow a few days earlier and no hazard trees were identified at that backcountry facility.

http://www.state.va.us/~dcr/dnh/invlist.htm.]

Invasive Alien Plant Species of Virginia

Canada Thistle

[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at http://webriver.com/tn-eppc/manual/ailant.htm.]

Tree-of-Heaven

Ailanthus altissima (Mill.) Swingle

[Taken from the Virginia Department of Conservation and Recreation, Division of Natural Heritage, Invasive Alien Plant List website, addressed at http://www.state.va.us/~dcr/dnh/invlist.htm.]

Garlic Mustard

(*Alliaria petiolata* (Bieb.) Cavara & Grande)

[Taken from the Virginia Department of Conservation and Recreation, Division of Natural Heritage, Invasive alien plant website, addressed at http://www.state.va.us/~dcr/dnh/invlist.htm.]

Japanese Honeysuckle

(*Lonicera japonica* Thunberg)

[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at http://webriver.com/tn-eppc/manual/polcus.htm.]

Japanese Knotweed

Polygonum cuspidatum (Sieb. & Zucc.)

[Taken from the **Plant Conservation Alliance, Alien Plant Working Group website. Material dated August 19, 1998. The web address is** http://www.nps.gov/plants/alien/fact/veth1.htm.]

COMMON MULLEIN (Verbascum thapsus L.)

[Taken from the Virginia Department of Conservation and Recreation, Division of Natural Heritage, Invasive Alien Plant List website, at http://www.state.va.us/~dcr/dnh/invlist.htm.]

Multiflora Rose

(*Rosa multiflora* Thunberg)

[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at http://webriver.com/tn-eppc/manual/celast.htm.]

Oriental Bittersweet

Celastrus orbiculata Thunb.

[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at http://webriver.com/tn-eppc/manual/paulow.htm.http://webriver.com/tn-eppc/manual/ailant.htm.]

Princess Tree

Paulownia tomentosa (Thunb.) Sieb. & Zucc. ex Steud.

[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at http://webriver.com/tn-eppc/manual/micros.htm.]

Japanese Grass or Eulalia

Microstegium vimineum (Trin.) A. Camus.

NEWS RELEASE

u.s. department of the interior

national park service

MEDIA BRIEFING
SHENANDOAH FIRES AFTERMATH
TOMORROW

What is the impact of the recent fires in Shenandoah National Park on plants, animals, streams, and historic resources? What steps will the National Park Service take to reduce the negative impacts of the fires? **There will be a media briefing on Friday, November 17th at 11:00 a.m.** to answer these questions.

A team of experts from the Department of the Interior, the Burn Area Emergency Rehabilitation Team, arrived at Shenandoah on November 13th to assess the impacts of the fire and develop a rehabilitation plan. **The head of the team, Erv Gasser, will report on the results of the team's assessment. Tom Blount, Supervisory Ecologist, will then visit two burn sites with the group, and discuss the ecological affects of fire.** The burn sites are close to the Skyline Drive and will require very little walking.

To attend the media briefing, travel on Highway 211 to Thornton Gap and turn into the parking lot for Panorama. Meet in the upper parking lot.

Please notify the Public Information Officer at (540)999-3300 by 5:00 p.m. today if you plan to attend.

Prepared 11/16/00

Author: Chuck <rafkindcd@altavista.com> at np--internet
Date: 11/17/2000 10:15 PM
Normal
TO: Erv Gasser at NP-PNRO, tom_blount@nps.gov at NP--INTERNET
CC: james_akerson@nps.gov at NP--INTERNET, linda_dees@nps.gov at NP--INTERNET,
wayne_millington@nps.gov at NP--INTERNET,
rich_resource_management@nps.gov at NP--INTERNET, holly_grubbs@nps.gov at NP--INTERNET,
ginny_rousseau@nps.gov at NP--INTERNET
Subject: <no subject>
---------- Message Contents ----------

Saturday, Nov. 18, 2000

Weeds now pose biggest threat in Shenandoah park

LURAY, Va. (AP) - Rangers at Shenandoah National Park are working to ensure that non-native weeds don't gain a chokehold following forest fires that charred thousands of acres over the past two weeks.

A rehabilitation team that surveyed the park after the forest fires determined that overall damage was minimal. No park structures were damaged.

The biggest threat, said Erv Gasser, a natural resource specialist from Seattle who led the survey team, will be that non-native vegetation in the park will fill the void left where fires burned off native plants along the ground.

"The non-native weeds are very aggressive and will use any chance possible to get a foothold, germinate and spread," Gasser told a news conference at the park Friday.

Japanese honeysuckle, tree of heaven and amber bittersweet are among the weeds that could choke out native plants, Gasser said.

To combat that, park rangers will be seeding native grasses in the coming days to help fend off foreign plants.

Overall, the fire that charred about 23,000 acres of parkland in Page, Rappahannock and Madison counties was low-intensity and moved quickly, said Tom Blount, the park's supervisory ecologist.

The park's wildlife was not hurt by the fires, Gasser said. In particular, the two threatened species that live in the park, the peregrine falcon and the Shenandoah salamander, emerged unscathed.

Park spokeswoman Lynn Rothgeb said many park visitors have been worried that wildlife like deer, bear and squirrels will be unable to find enough food to survive through the winter. But on a tour through a park trail she pointed out an abundance of acorns and other food sources that will be available.

"And there are all kind of oases throughout the park that didn't burn at all," she said.

Blount said park visitors who tour Skyline Drive will easily be able to spot the damage caused by the fires. Ground right along the road is burnt black, but the fires did little damage to the canopy; some thin-barked tress like maples and yellow poplars might be damaged, but others like oaks and pines won't be harmed.

Aquatic life will actually benefit from the fires, Blount said.

"Trees that drop into streams will help provide cover ... that will benefit

fisheries and other aquatic life," he said. "There are always positive and negative results to the ecology when there's a forest fire."

-

On the Net:

http://www.shenandoahfires.com/

_AP-ES-11-17-00 1644EST _

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ATTENTION HIKERS

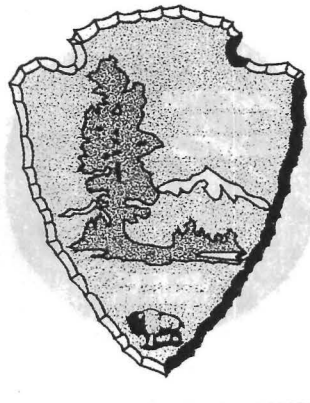
Due to a recent wildfire, backcountry camping is prohibited in the following areas: (until May 25, 2001)

- **Nicholson Hollow Trail** (Skyline Drive to Hannah Run Trail)
- **Corbin Cabin Cutoff Trail**
- **Indian Run Trail**

Beware! Fire-weakened trees and limbs can fall at any time. This is a fragile area. Stay on the trail.

Do not disturb or remove natural or cultural objects. LEAVE WHAT YOU FIND.





ATTENTION HIKERS

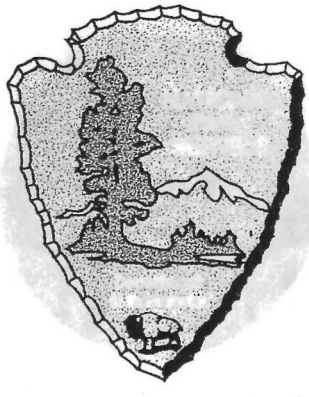
Due to a recent wildfire, backcountry camping is not recommended in this trail area.

Beware! Fire-weakened trees and limbs can fall at any time.

This is a fragile area. Stay on the trail.

Do not disturb or remove natural or cultural objects. LEAVE WHAT YOU FIND.

LEAVE NO TRACE OUTDOOR ETHICS



Shenandoah Fire Complex, Nov. 2000
Fire Summary and Tips for Trail Overseers

Prepared by Shawn Green, Park Trails Coordinator; Date: Nov. 15, 2000

Overview: The Pinnacles Fire (Oct. 29th) and Old Rag Fire (Oct. 30th) grew together over a twelve-day period into the SNP's largest wildland fire (24,197 acres). Both fires are believed to be caused by humans. Sixty-one percent (14,829 acres) of the fire occurred in designated Wilderness. The month of October brought no rain to the Blue Ridge, so the surface fuels (leaf litter, duff, and down limbs) were very dry prior to the fire. Once the fires got started, strong winds blew the fire into steep, rocky terrain. The rest is history. The fire was contained within 37 miles of control lines (hand lines, dozer lines and roads). As the fire slowly grew, numerous attempts were made to stop the fire using existing trails as fire lines. In most cases, the fire spotted across these trails.

The fire took in 7.0 miles of Appalachian Trail, and 43.7 miles of Blue Blazed Trails. This trail mileage is maintained by approx. 25 PATC volunteer trail overseers. The fire also included 10.8 miles of Horse Trails; and 7.0 miles of Fire Roads maintained by NPS crews. See attached list of trails.

Closure: All fire-impacted park trails will be reopened on Nov. 17, 2000. The upper portion of Nicholson Hollow and Corbin Cabin (between Skyline Drive and Hannah Run) will be closed to overnight camping until May 25, 2001. This temporary closure is to protect fragile backcountry resources prior to green-up.

Fire Behavior: The fire intensity has been characterized as low to moderate. Dry fuel conditions allowed for a very complete burn of the light fuels in some areas. On the positive side, leaf litter and much of the small debris on the forest floor from the Ice Storm of '98 has been consumed, but not down to mineral soil. Those overseers who had gotten behind on weeding their trail this year have been forgiven, most of the grasses, weedy vegetation and briars have been consumed. On the negative side, the fire burned with enough intensity to brown the leaves of the mountain laurel. The mountain laurel will respond by sending up new shoots from the rootstock, but the above ground portion of the laurel will die back next year. This will change the appearance of many of your favorite trails.

Hazard Trees: The park does not manage for hazard trees in the backcountry setting. The advice is still the same, "Look up, before you set up!" As overseers, do not stop or camp under standing dead or weakened trees that could come down at any time. The fire burned through an area of the park populated by large numbers of standing dead trees. In many cases the fire burned up the outside of the standing dead oaks. So now the area is populated by a large number of fire scarred standing dead trees. In addition, there are now fire weakened trees scattered about. These are trees, live or dead, that have weak points where the fire entered the tree and burned out rotted interior wood. Many of these fire weakened trees have come down, and many are yet to come down this winter and beyond.

Fire Line Construction: When a maintained trail, such as the Appalachian Trail or a Blue Blazed trail was used as a fire line, fire crews used leaf blowers and fire rakes to clear leaf litter off the tread, then cut out standing dead trees that might carry fire across the trail. Trail impacts were minimal. In places hand lines intersect trails, here lines are cleared down to mineral soil and vegetation is cut out on both sides. It is very much like new trail construction.

Post-fire Trail Rehab: As the fire became contained, fire crews were assigned to rehab portions of trail impacted by fire line construction. These crews used chainsaws to clear blowdowns and extremely hazardous fire weakened trees immediately adjoining the trail. These crews also camouflaged and stabilized fire lines that intersected maintained trails. After the fire was controlled, all maintained trails within the fire were cleared of fire related blowdowns.

Immediate Trail Maintenance Concerns:

- **Wear old clothes:** For the next couple of years, doing trail maintenance in the burn area will mean handling charred wood and debris. The charcoal will rub off on clothes and gear. It may not come out in the wash.
- **Accelerated runoff:** Until spring green-up occurs water will tend to run off the steep hillsides in the burn area faster than normal. Waterbar maintenance will be important particularly on the trails with known erosion problems and those that are overdue for routine maintenance.
- **Reblazing:** On any trails that are overdue for reblazing, this would be the winter to do it. Please do not over-blaze, just freshen up existing blazes.
- **Shortcuts:** Places where stacked limbs have been used to obstruct shortcuts now look like old campfires with charred wood. You may have to work hard to find replacement wood, or consider other methods to obstruct shortcuts, such as rockwork or selectively cut dead laurel.

Spring Opening of Trails:

- **Clear blowdowns:** Expect an increased workload from both heavy and light fire related debris falling across trails this winter.
- **Tread maintenance:** A wet winter may mean more waterbar clearing than usual because of accelerated runoff from burned hillsides.

Summertime Trail Maintenance:

- **Vegetation maintenance:** Expect a new flush of vegetation that should keep you busy as last summer keeping your trail open. By June, evidence of the ground fire will be fast disappearing. There will be plenty of other reminders for years to come.

Long-term Trail Maintenance:

- **Change in vegetation:** Over the next few years woody debris will continue to fall across the trails as mountain laurel and other fire-impacted shrubs and saplings come down. The new growth of replacement woody vegetation will require your tender loving care for years to come as you shape your trail corridor.
- **Help!:** Should you need help, keep your PATC district manager or park Trails staff informed. Don't wait until your trail turns into a jungle. Let's work together, and come to appreciate the fascinating effects of this wildland fire.

Shenandoah Complex/ Trails Summary: Update: 11/10/00

Nov. 2000 (Trails are listed north to south)

Trail Name	Miles	Wilderness?	Fire Line?	Location:
Appalachian Trail	7.0	No	Partial	several sections
Blue Blazed Trails				
Buck Hollow Trail	3.7	Yes	Partial	
Buck Ridge Trail	2.3	Yes	Partial	
Marys Rock Trail	0.3	No	None	
Leading Ridge Trail	1.1	Yes	Partial	lower end
Hannah Run Trail	3.7	Yes	None	
Catlett Spur Trail	1.1	Yes	None	
Catlett Mountain Trail	1.2	Yes	None	
Sams Ridge Trail	1.6	Yes	None	
Broad Hollow Trail	2.4	Yes	None	
Crusher Ridge Trail	1.8	No	Entire	
Corbin Cabin Cutoff	1.4	Yes	Entire	
Hot Mt-Short Mt Trail	2.2	Yes	None	
Meadow Spring Trail	0.7	No	Entire	
Nicholson Hollow Trail	5.5	Yes	Partial	upper end
Indian Run Trail	2.3	Yes	Entire	
Corbin Mountain Trail	3.8	Yes	Partial	upper end
Corbin Hollow Trail	2.0	Yes	None	
Robertson Mountain Trail	2.4	Yes	None	
Ridge Trail	3.1	Yes	Partial	
Saddle Trail	1.1	No	Partial	
Total Miles Blue Blazed Trails:	**43.7**			
Yellow Blazed Trails				
White Rocks Trail	1.7	Yes	None	
Hazel River Trail	2.8	Yes	None	
Hazel Mountain Trail	4.6	Yes	Partial	upper end
Pine Hill Gap Trail	1.7	Yes	Partial	lower end
Total Miles Yellow Blazed Trails:	**10.8**			
Administrative Roads/Trails				
Weakley Hollow Road	2.4	No	Entire	
Old Rag Road	5.1	No	Partial	
Berry Hollow Road	0.8	No	Enitre	
Total Miles Admin Roads/Trails:	**8.3**			

QUOTE

Kinko's (540) 433-9287
1010 South Main St
Harrisonburg, VA 22801

NOT A RECEIPT

QTY/LIST		DISC	PRICE	AMOUNT
1250	FS B&W D/S WHITE STD			
0.13		0.03	0.10	1250.00
1250	FS COLOR S/S 11 X 17			
2.98		1.40	1.58	1975.00
625	FS COLOR S/S LTR, LGL			
1.49		0.70	0.79	493.75
500	FS B&W TABS PER TAB			
0.30		0.05	0.25	125.00
125	BIND COMB CLEAR STANDARD			
3.45		0.00	3.45	431.25

SUB 4275.00 TX 192.38 TOT 4467.38

NOT A RECEIPT

125 COPIES

Quote No.: 34598
Customer: SHEN COMPL
Phone: (540) 999-3304

CW 7 RG 3 11/15/00 11:06
Visit us @ http://www.kinkos.com

QUOTE

Kinko's (540) 433-9287
1010 South Main St
Harrisonburg, VA 22901

NOT A RECEIPT

QTY/LIST		DISC	PRICE	AMOUNT
10000	FS B&W D/S WHITE STD			
0.13		0.03	0.10	1000.00
1000	FS COLOR S/S 11 X 17			
2.98		1.40	1.58	1580.00
500	FS COLOR S/S LTR, LGL			
1.49		0.70	0.79	395.00
400	FS B&W TABS PER TAB			
0.30		0.05	0.25	100.00
100	BIND COMB CLEAR STANDARD			
3.45		0.00	3.45	345.00

SUB 3420.00 TX 153.90 TOT 3573.90

NOT A RECEIPT

100

Quote No.: 34597
Customer: SHEN COMPLEX
Phone: (540) 999-3304

CW 7 RG 3 11/15/00 10:58
Visit us @ http://www.kinkos.com

FIRE CHRONOLOGY

On October 29, 2000 two fires were reported in Shenandoah National Park. The Rapidan Road fire was contained on Monday, October 30th early in the morning; it reached 51.6 acres in size. The Pinnacles Fire grew despite initial efforts to contain it. On October 30th at approximately 7 p.m. an additional fire started on Old Rag. By October 31st, two crews were fighting the Pinnacles Fire, and one crew was assigned to Old Rag. The Pinnacles fire was 180 acres in size on October 31st. Flames were 1-5 feet in length, driven by gusts of wind and low relative humidity. Pushed by winds, both fires grew. By November 1st the Pinnacles Fire had grown to 850 acres and the Old Rag Fire was 500 acres in size.

November 1

Despite the best efforts of 120 firefighters, both fires gained ground. Smoke hampered the use of helicopters and wind and the thick layers of dead leaves carried fire across the terrain. The Old Rag Fire grew around its entire perimeter, while the Pinnacles Fire moved mostly southward.

November 2

By November 2ndthe fires had blackened about 1500 acres. Firefighters made good progress on the two fires on November 2nd, with firelines beginning to pinch off the fire's progress in critical areas. However, both fires gained considerable ground through the day and night. The Pinnacles Fire reached 4000 acres in size and the Old Rag fire 3900. Both Page and Madison Counties declared states of emergency and Page County instituted a voluntary evacuation of Jewell Hollow. No homes burned. The ranks of firefighters increased to 600 as assistance poured in from all over the country.

November 3

Efforts focused on holding firelines in critical areas of the two fires. No homes burned. Firefighters worked to hold the fires within the park as much as possible. The Incident Command Team decided to fall back to defensible ground on park's perimeter and allow the two fires to grow together over the course of the next several days within the park where structures were not threatened. The Virginia Department of Health issued a health advisory for people at risk of adverse effects from smoke.

November 4

Cooler temperatures and higher relative humidity allowed firefighters to make good progress on the two fires. They completed containment lines on the south side of the Old Rag Fire. They also made significant progress on other critical portions of both fires where firefighters strengthened firelines by carefully burning away fuels inside the firelines. The fire complex reached 13,200 acres.

November 5

Firefighters completed and strengthened containment lines on the west flank of the two fires, which were growing together. Higher winds pushed hard on the northeast portion of the blaze, challenging firefighters there. About 90 firefighters stayed on duty over the night to hold lines and keep an eye on active areas. Firefighting strategists began treating the two fires as one fire, called the Shenandoah Complex. The fire had spread over 15,750 acres.

November 6
Firefighters took advantage of cooler temperatures and higher humidity. Bulldozers and hand crews continued to build line on the east flank of the fire. As line was built, crews followed behind, lighting leaves and other vegetation, which burned back into the approaching fire. Crews remained on the fire throughout the night to hold the line and to patrol the fire perimeter. The two fires burned together. Due to burnout operations, the fire reached 19,172 acres. The fire remained within established containment lines.

November 7
Firefighters made good progress on control lines on the east flank of the fire. Smoke trapped by an inversion layer limited air support. Light rain fell in a few areas, providing little aid to suppression efforts. Night crews burned out along the fireline constructed yesterday. Engine crews remained to hold the line and to patrol the fire perimeter. The fire reached 22,152 acres. The increase in acreage burned was within the firelines as fire consumed unburned islands.

November 8
Firefighters completed and strengthened control lines on the east flank of the fire. Elsewhere efforts began in mopping up lingering hot spots and rehabilitating secured firelines. Engine crews held and patrolled lines during the night. The fire reached 23,941 acres as unburned islands inside the firelines continued to burn. Poor visibility due to heavy smoke
continued.

November 9
The fire area received a good soaking rain throughout the day on November 9th. The rain helped to cool hot spots and aided suppression efforts. Firefighters continued to secure firelines, clear snags, and extinguish smokes and hot spots within 66 feet of the fireline.

November 10
With fire danger greatly reduced, many firefighters were headed home. Crews remained for several days to finish rehabilitating firelines and trails. Rehabilitation work included removing hazardous snags along Skyline Drive and on trails that were used as firelines., and installing water bars on steep sections of hand lines to minimize erosion. In addition, crews worked to restore bulldozer lines to their original landscape.

OTHER FACTS

Total Acreage
The Shenandoah Complex fire was contained at 24,197 acres on November 12th.

Resources Used in Firefighting Effort
At the peak of the fires resources included:
852 people
47 fire engines
13 watertenders
8 bulldozers
9 aircraft

SHENANDOAH COMPLEX FIRES Shenandoah National Park

EMERGENCY RESTRICTIONS IN EFFECT

Per order, Acting Superintendent, Shenandoah National Park

The following restrictions are in effect within Shenandoah National Park:		
Trails open for hiking but temporarily **closed to backcountry camping**	*No camping along the following trails until May 25, 2001:* Corbin Cabin Cutoff Trail, entire length. Indian Run Trail, entire length. Nicholson Hollow Trail between its junction with the Skyline Drive and its junction with the Hannah Run Trail.	
Backcountry Cabin Closed	Corbin Cabin (backcountry cabin operated by the Potomac Appalachian Trail Club) will be closed until May 25, 2001.	
The following were previously closed, but have been REOPENED:		
Public Roads	Skyline Drive between Thornton Gap (MP 31.5) to the north entrance to Skyland (MP 41). All of Skyline Drive is now open.	
Trails	Appalachian Trail from Thornton Gap (U.S. Rte 211) to Skyland Ridge Trail Saddle Trail Marys Rock Trail Buck Hollow Trail Buck Ridge Trail Old Hazel Trail White Rocks Trail Hazel Mountain Trail Hazel River Trail Catlett Spur Trail Cedar Run Trail	Catlett Mountain Trail Sams Ridge Trail Broad Hollow Trail Pine Hill Gap Trail Hot Short Mountain Trail Nicholson Hollow Trail Corbin Cabin Cutoff Trail Indian Run Trail Corbin Mountain Trail Corbin Hollow Trail Robertson Mountain Trail Leading Ridge Trail
Fire Roads	Old Rag Fire Road, entire length. Weakley Hollow Fire Road, entire length. Berry Hollow Fire Road, entire length.	

Revised 1200, 11/17/2000

Shenandoah Complex Effects Summary 11/16/00
Burned Area Emergency Rehabilitation Team

Vegetation

The vegetation throughout the burned area has been reviewed from the air and on the ground by the BAER team vegetation specialist and the park resources staff. Overall, the burn effects on the hardwood forest were found to be minimal. Large trees have survived within the majority of the burned area. There are some areas along Skyline drive and in the forest where the above-ground portions of the mountain laurel have been killed. However, the laurel is still alive and will sprout vigorously from the base next spring. Invasion of non-native plant species has been the main concern of the vegetation specialists. Concern is highest in areas that have experienced vegetation removal such as the overlooks, or areas effected by suppression activities such as fire lines created by bulldozers or hand crews. Plans are in place to monitor for non-native plants within the burned area for the next three years, re-seed native grasses on very vulnerable sites (bulldozer lines, overlooks), and spot control non-native plants if they are found within the burn area.

Soil and Watershed

The Shenandoah Complex fires consumed mostly ground fuels and leaf litter. In many cases, the leaf litter was charred but not completely consumed. However, the effective ground cover in these areas has been reduced. Moderate to strong hydrophobicity (water repellency) was found in some areas but is very spotty and covers only 15 to 20% of the area. A few areas have strong water repellency, but these areas had strong water repellency prior to the fire. Nearly all soils have a dense network of fine roots near the surface that were not damaged by the fire and will reduce the potential for erosion. In addition, most of the soils have a large amount of rock fragments on the surface that will offer additional protection from erosion. The vast majority of the burn area was low burn severity. All of the above factors combine to create a situation where a significant increase in runoff or erosion is not expected. Because of the low burn severity, impacts to human life, property, and critical natural and cultural resources within and downstream of the burned areas are expected to be minimal. No watershed treatments are recommended.

Archaeological Resources

The majority of recorded cultural sites within the fire area date to the historic period. Because of their wooden construction, these sites are more vulnerable to damage. While the fire was of low burn severity, it was hot enough to shatter some surface artifacts. Where possible, firefighters protected standing structures, including the Jenkins and Corbin Cabins. Archaeological assessment is now determining if other historic sites were damaged. Fire-damaged archaeological sites will be protected as needed to prevent further loss of information to accelerated erosion.

Wildlife and Fisheries

One Federally listed Threatened and Endangered species is known to occur within the burned area. The Shenandoah salamander (Plethodon shenandoah) is known to be in three isolated populations within Shenandoah National Park. The Shenandoah salamander typically goes into hibernation in the winter following the first freeze, which had already occurred. There are two areas of salamander habitat within the burn. The larger area of the two was largely left unburned. The smaller area was burned through but only accumulations of leaves and other fine fuels were impacted. The fire had no effect on the salamander.

The Peregrine falcon (*Falco peregrinus anatum*) is not known to inhabit areas within the park during the fall and winter months. The known eyrie was not located within the burn itself. The fire had no effect on the falcon.

The fisheries within the park will have a short-term benefit as a result of the fire. Some trees that had to be cut for the fire line were dropped into or across streams. They will provide habitat for fish and aquatic macroinvertebrates.

REQUEST FOR FORMAL BID

Date:

To:

From: USDI Burned Area Emergency Rehabilitation Team

Attached is a formal bid sheet for your consideration and completion. The Department of the Interior BAER Team is currently attempting to reseed portions of the Shenandoah Fire Complex in Virginia. **Your prompt response is necessary.**

The following stipulations will be included in the purchase agreement should your firm be selected. Please review the following stipulations carefully. Should you be unable to meet any one of the following criteria, we would request that you fill out the sheet as a **NO BID** and return it to the faxed number listed below.

SEED CERTIFICATION REQUIREMENTS:

1) All seed will have no less than 80% germination and 90% purity. Inert matter must not exceed 10%.

2) Vendor will provide certification that the seed has been tested for weed content and inert matter within the past 90 days. **Seed certification tag without testing documentation will not be accepted.** Seed will be packaged in 50 pound sacks.

3) All seed will be certified **NOXIOUS WEED FREE and EXOTIC SPECIES FREE.**

4) **No substitute species will be accepted.**

5) All quotes are to be recieved by no later than (*insert date and time*) Eastern Standard Time.

6) Quoted prices are to include shipping costs (FOB Luray, Virginia).

7) Delivery date will be no later than (*insert date and time*) Eastern Standard Time.

8) Successful vendor will be notified by (*insert date and time*) Eastern Standard Time.

Direct questions to (*procurement specialist*), at (*phone number*).
Fax bid to: ATTENTION -SHENANDOAH SEED BID, (*FAX number*).

SPECIES	PER POUND MIX WEIGHT RATIO (Pure Live Seed Basis)	$ COST
Virginia Wildrye (*Elymus virginicus*) (only sources native to VA, PA, WV, MD, NY are acceptable)	52%	
Big Bluestem (*Andropogon gerardii*) (only sources native to VA, PA, WV, MD, NY are acceptable)	19%	
Deertongue (*Dicanthelium clandestinum*) (Tioga variety or sources native to VA, PA, WV, MD, NY are acceptable)	18%	
Switchgrass (*Panicum virgatum*) (Shelter variety or sources native to VA, PA, WV, MD, NY are acceptable)	11%	
TOTALS	100%	

VENDOR'S TOTAL BID PRICE (FOB Luray, Virginia)

500 pounds mixed seed (pure live seed basis)	$

Vendor Name/Address: _____

_____

_____

_____

_____

I hereby certify that this bid is submitted in accordance with attached stipulations:

Vendor Representative: _____ Date: _____

Phone/Fax: _____

SUGGESTED VENDORS:

ERNST CONSERVATION SEEDS
9006 Mercer Pike
Meadville, PA 16335
(814) 336-2404, (800) 873-3321 phone
(814) 336-5191 fax

SYLVA NATIVE NURSERY AND SEED CO.
1683 Sieling Farm Rd.
New Freedom, PA 17349
(717) 227-0486 phone
(717) 227-0484 fax

LOFTS SEEDS, INC
PO Box 146
Bound Brook, NJ 08805
(201) 356-8700 phone

SEED, INC.
307 Horsham Rd.
Horsham, PA 19044
(215) 675-2186 phone

SEEDWAY
PO Box 250
Hall, NY 14463
(716) 526-63910 phone

SOUTHERN TIER CONSULTING, INC.
2701-A Rt. 305
PO Box 30
W. Clarksville, NY 14786
(716) 968-3120 phone

STANFORD SEED CO.
RR 1, Box 320
Denver, PA 17517


Department of the Interior
BAER
TEAM
Burned Area Emergency Rehabilitation